SELECTED SHRUBLAND AND GRASSLAND COMMUNITIES

OF THE NORTHERN GREAT PLAINS

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A Report to the Nebraska National Forest

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EXECUTIVE SUMMARY

Conservation of the community/ecosystem level of biological organization is a key component of a comprehensive approach to biodiversity conservation. The Conservancy and its Natural Heritage Program partners have completed a national classification of ecological communities. These types have been preliminarily ranked in terms of their rarity, using a scale from G1 (Global 1, critically imperiled globally due to rarity, endemism, and/or threats) to G5 (little to no risk of global elimination). Currently, approximately 144 G1 - G3 communities are known from the Northern Great Plains region, where a region-wide management review is underway by the Great Plains program of the Nebraska National Forest. A total of 52 G1 and G2, as well as eight G3 communities, were described in a previous report (Faber-Langendoen *et al.* 1997).

This report serves as an addendum to the 1997 effort, providing descriptions for an additional 28 shrubland and grassland communities ranked G3-G5. These descriptions should allow for improved inventory of these types, thereby leading to a future refinement of the preliminary global rank, as well as guidance on conservation actions.

Fifteen additional shrubland and grassland types were researched and tentatively described. This process brought to light classification issues that forced these types to be "archived" until additional research can resolve specific classification issues. These tentative descriptions are included as an appendix to help document the classification process and status.

INTRODUCTION

Federal, state and private agencies and organizations in the Northern Great Plains region are concerned with the conservation of ecological communities. Ecological communities[1], which can be viewed as the biotic component of ecosystems, are one level of biological diversity, which includes all levels of biological organization - genes, species, communities, and ecosystems. Conservation of the community/ecosystem level of biological organization is a key component of a comprehensive approach to biodiversity conservation.

Ecological communities have been tracked as elements of conservation by The Nature Conservancy (TNC) and the Natural Heritage Programs for nearly twenty years, and exemplary occurrences of all communities (as well as those of rare species) have helped form the basis for protection decisions throughout the Conservancy's history. The ecological community concept was recognized as a critically important conservation tool because: (1) communities have inherent value that is worth conserving (e.g., they provide important ecosystem functions); (2) by protecting communities, many species not specifically targeted for conservation are protected as well; and (3) communities can be used as surrogates in areas where little is known about species patterns or ecological processes, e.g., in tropical forests or desert areas.

The absence of a national classification of these communities has hindered our understanding of them. To meet this need, The Nature Conservancy, in conjunction with state Natural Heritage Programs, has drafted a comprehensive classification of all natural and semi-natural ecological communities across the country (Grossman *et al*. 1998, Schneider *et al.* 1997). The classification utilizes a physiognomic-floristic ordering of existing vegetation that can be applied internationally. The system is hierarchical, with physiognomic criteria at the highest levels of the hierarchy and floristic criteria at the lowest levels. The formation concept guides both the definition of the physiognomic units and shapes the floristic units. The association and alliance concepts define the floristic units in the context of the physiognomic units. This system brings together the broad-scale geographic patterns of physiognomic characteristics with that of local, site-specific, floristically-defined units. In combination, these hierarchical levels can satisfy a broad range of objectives for use in a single classification system.

The association is currently the lowest level of the hierarchy, as well as the basic unit for vegetation classification, in the national classification system as it applies to North America. The association is defined as "a plant community of definite

[1]Ecological communities are defined as a species assemblage that co-occur in a defined area at a certain time and that potentially interact with one another. Typically some characteristics of the habitat are included, either directly or indirectly, when defining ecological community types.

floristic composition, uniform habitat conditions, and uniform physiognomy," a concept that has been used by most of the schools of floristic classification (see Grossman *et al*. 1998). The association concept as used here applies to existing vegetation regardless of successional status. The value of using the association level as the most basic unit of the classification is that the full complement of vascular plant species and ecological factors are used to help define the units. The term community type, as used throughout this report, is synonymous with "association."

RANKING METHODS

Once communities are classified to the association level, they are ranked according to their relative endangerment (Grossman *et al*. 1994). Ranking is done at the association level. The ranking system is intended to help determine conservation priorities, whereby more endangered community types are considered higher priority (endangerment *per se* is, however, only one of several factors that are considered when setting conservation priorities).

Community types are ranked on a global, national, and state scale of 1 to 5. A rank of G1 (Global 1) indicates that a community type is critically imperiled globally due to rarity, endemism, and/or threats, and a rank of G5 indicates little to no risk of global elimination (see Table 1). Similar definitions apply to national and state ranks (Grossman *et al*. 1994).

ESTIMATING RANKS

Although community ranking is best done when the information on the factors listed above is available, it is often necessary to do some preliminary ranking when the information is incomplete. This is particularly true when community types have not been well described. Four main factors are useful in providing some preliminary assessment of a community's global rank: range, long term decline across the range, the degree of site specificity, and the commonness or rarity across the range (as ranked by state Natural Heritage Programs).

The two major criteria that determine the rank of a community type are the total number of occurrences and the total area (acreage) of the community range-wide. Measures of geographic range, trends in status (expanding or shrinking range), trends in condition of remaining acreage, threats, and fragility are secondary factors that are considered when assigning a rank (Table 2).

TABLE 1. GLOBAL RANKING DEFINITIONS AND CODES

G1 = Critically imperiled globally because of extreme rarity (typically five or fewer occurrences or very few remaining acres) or because of some factor(s) making it extremely vulnerable to extirpation.

G2 = Imperiled globally because of extreme rarity (typically six to 20 occurrences or few remaining acres) or because of some factor(s) making it very vulnerable to extirpation.

G3 = Vulnerable; either very rare and local throughout its range or found locally (even abundantly at some of its locations) in a restricted range (e.g. a single Great Plains state, a single physiographic or ecoregional unit) or because of other factors making it vulnerable to extirpation throughout it's range.

G4 = Apparently Secure; Uncommon, but not rare (although it may be quite rare in parts of its range, especially at the periphery). Apparently not vulnerable in most of its range.

G5 = Secure; Common, widespread, and abundant (though it may be quite rare in parts of its range, especially at the periphery). Not vulnerable in most of its range.

GU = Unrankable; Status cannot be determined at this time.

G? = Unranked; Status has not yet been assessed.

Modifiers and Rank Ranges

? A question mark added to a rank expresses an uncertainty about the rank in the range of 1 either way on the 1-5 scale.

G#G# Greater uncertainty about a rank is expressed by indicating the full range of ranks which may be appropriate.

Q A "Q" added to a rank denotes questionable taxonomy. It modifies the degree of imperilment and is *only* used in cases where the type would have a *less imperiled* rank if it were not recognized as a valid name (i.e. if it were combined with a more common type).

TABLE 2. CRITERIA USED FOR RANKING

The criteria for ranking are based on a set of quantitative and qualitative factors. These factors are listed below in order of their general importance:

a. Number of Element Occurrences (EOs):
the estimated number of EOs throughout the Element's global range;

b. Abundance:
the estimated global abundance of the Element (measured by number of individuals, or area, or stream length covered);

c. Size of Range:
the estimated size of the Element's global range;

d. Distribution trend:
the trend in the Element's distribution over it's global range;

e. Number of protected EOs:
the estimated number of adequately protected EOs throughout the Element's global range;

f. Degree of threat:
the degree to which the Element is threatened globally;

g. Fragility:
the fragility or susceptibility of the Element to intrusion;

h. Other global considerations:
for example, the quality or condition of EOs that affect or may affect endangerment status; unexplained population fluctuations; reproductive strategies that are dependent on specific habitat; etc.

COMMUNITY CHARACTERIZATION ABSTRACTS

We used the Conservancy's standard form for describing community types (called a Community Characterization Abstract or CCA) and compiled information for selected fields in that form. The resulting descriptions are compiled here for selected shrubland and grassland communities in the Northern Great Plains. Communities selected for this project are considered characteristic, albeit rare or uncommon, for national forest lands in the region. These descriptions should allow for improved inventory of these types, thereby leading to a future refinement of the preliminary global rank, as well as guidance on conservation actions.

The descriptions included in this report were compiled by the authors from the literature and personal field experience with these types. These descriptions have been reviewed by others who are knowledgeable of these types. The most current versions of these descriptions are maintained by the Conservation Science Department of The Nature Conservancy in cooperation with state Natural Heritage Programs.

The naming conventions for the community types (or associations) are as follows: (1) dominant or diagnostic canopy species are listed first, (2) a "/" separates species in different strata, whereas a "-" separates species within the same stratum[2], (3) species placed in parentheses have lower constancy (they are less consistently found in all stands of the element), (3) an environmental term is occasionally used as part of the name when the defining species of an association are not well understood, and (4) the species names are ordered loosely, generally reflecting decreasing levels of dominance, constancy, or indicator value. A maximum of six species are currently allowed in a name, though fewer is desirable. Plant nomenclature follows the nationally standardized list of Kartesz (1994), with few exceptions to accommodate more recent changes in the taxonomy or nomenclature of plant species used as nominals.

The distribution of the community types is given by state, by ecoregion (using Bailey *et al*. 1994), and by National Forest ownership. The latter information is incomplete, and needs further review from resource managers in the Northern Great Plains.

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[2]A stratum is defined as a combination of life-form and height, e.g. a tall shrub stratum is defined by the shrub life-form that is between 1 and 5 m tall.

The relationship of the community types described here to other classifications is also given. This relationship is represented by a “=“, “+”, “-” or “I.” An “=“ sign means that the other name is equivalent to the community type. A “+” sign means that the other name is more broad in concept than the described community type. A “-” sign means that the other name is less inclusive (narrow in concept) than the community type. Finally an “I” means that the other name partly intersects the community type, but the relationship is not straightforward.

Throughout the process of classification and description, new information comes to light that may cause a significant change in the concept of an association. For example, one type may, through research, be better considered "split" into two new types. One poorly described type may be "lumped" with another, better described type. When this occurs, the new types are assigned conservation ranks and the descriptions of previously described types are archived. While these latter types will no longer be utilized as current classification units, their descriptions are archived in order to maintain a record of classification development (Appendix 1). The classification comments field in each of these archived types is denoted ARCHIVED, then provides a brief summary of how the concept for that association will be changed. In some cases, where significant new research is required to clarify a given type, a summary of possible solutions is provided. Additional work will be required to resolve the classification concept of those types.

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INDEX TO ASSOCIATION DESCRIPTIONS

FORMATION: Microphyllous Evergreen Shrubland (III.A.4.N.a)

FORMATION: Temperate or Subpolar Grassland with a Sparse Shrub Layer: Medium-tall temperate or subpolar grassland with sparse needle-leaved or microphyllous evergreen shrub layer (V.A.7.N.e)

FORMATION: Temperate or Subpolar Grassland: Tall sod temperate grassland (includes sod or mixed sod-bunch graminoids) (V.A.5.N.a)

FORMATION: Medium-tall bunch temperate or subpolar grassland (includes sod or mixed sod-bunch graminoids) (V.A.5.N.c)

FORMATION: Medium-tall sod temperate or subpolar grassland (V.A.5.N.d)

FORMATION: Temporarily flooded temperate or subpolar grassland (V.A.5.N.j)

INDEX TO ARCHIVED ASSOCIATION DESCRIPTIONS

FORMATION: Microphyllous Evergreen Shrubland (III.A.4.N.a)

CLASS: SHRUBLAND

FORMATION: MICROPHYLLOUS EVERGREEN SHRUBLAND (III.A.4.N.A)
ALLIANCE: ARTEMISIA TRIDENTATA SSP. WYOMINGENSIS SHRUBLAND ALLIANCE

ARTEMISIA TRIDENTATA - ATRIPLEX CONFERTIFOLIA SHRUBLAND

COMMON NAME: Big Sagebrush - Shadscale

COLLOQUIAL NAME: Wyoming Big Sagebrush - Spiny Saltbush Shrubland

COMMUNITY SUMMARY: This sagebrush shrubland occurs in the northwestern Great Plains (especially in badlands regions). Stands occur on shallow to deep soils with a comparably wide range of textures. Soils are derived from sedimentary formations ranging from Chugwater Sandstone to Pierre Shale, including those with a calcareous composition and they tend to have both high pH (7.6-8.4) and conductivity. This type is apparently not slope or aspect restricted, occurring on both alluvial fans/terraces and highly eroded badlands with steep slopes (>80%). The known elevational range is from approximately 3,000 to 4,700 ft. The visual aspect of this association, especially where it occurs on badlands and eroded surfaces, is often that of a depauperate shrubland. Though shrub canopy cover for the modal expression of the type is less than the 25% required for a shrubland descriptor, the cover of all other layers is even less, rendering this type a shrubland. *A. tridentata* ssp. *wyomingensis* and *Atriplex confertifolia* constitute from 5 to 25% combined cover, with *A. tridentata* strongly dominant. In the Bighorn Basin and Bighorn Sedimentary Mountains Sections of Montana, other shrubs with greater than 50% constancy (but < < 5% canopy cover) include *Atriplex nuttallii*, *Sarcobatus vermiculatus*, *Ceratoides lanata*, and *Chrysothamnus nauseosus*. Subshrubs *Eriogonum brevicaule* and *E. pauciflorum* are relatively constant on a regional basis. There is little consistency to the composition of the herbaceous layer, which varies site to site and evidences regional variation as well. The graminoids constitute the next most abundant component, but their combined cover usually does not exceed 5%; those grasses with the highest constancy are *Oryzopsis hymenoides*, *Stipa comata*, and *Aristida purpurea*. *Phlox hoodii*, *Sphaeralcea coccinea* and *Opuntia polyacantha* appear to have the highest constancy values, but seldom exceed 1% cover.

CLASSIFICATION COMMENTS: With additional review, this type will likely be combined with the more widespread *A. tridentata* ssp. *wyomingensis - Atriplex confertifolia* association (GECL1040). DeVelice and Lesica (1993) provide the only formal key to this type; they may have erred by not stipulating that *A. tridentata* must be present (at any cover value) and noting only that *A. confertifolia* be well represented (>5% canopy cover). This association is distinguished by the predominance of the shrub layer (*A. tridentata* dominant, *A. confertifolia* sub-dominant) and the sparse, depauperate nature of the herbaceous component. With additional data, this type may also be appropriately classified in the sparse vegetation class.

SIMILAR COMMUNITIES: Brown's (1971) *Sarcobatus vermiculatus* badlands community (on eroded slopes) appears very similar to the *A. tridentata – A. confertifolia* association (with the addition of *S. vermiculatus* as a dominant/co-dominant), as does *Chrysothamnus nauseosus / Eriogonum brevicaule*.

OTHER NAMES:

RELATION TO OTHER NAMES:

COMMENTS ON OTHER NAMES:

ECOREGIONAL DISTRIBUTION: This association is found in Province M331, Bighorn Sedimentary MountainsSection (B):CC| others M331 Sections:C?| Province 342, Bighorn Basin Section (A):CC| Province 331, Northwestern Great Plains Section (F):CC| Powder River Basin (G):CC| other 331 Sections:C?

STATE DISTRIBUTION: This association has been documented from Montana and Wyoming and is reported from North Dakota (Schneider et al. 1997)

NORTHERN GREAT PLAINS NATIONAL FOREST DISTRIBUTION:

ENVIRONMENTAL DESCRIPTION: Within badland settings this type is found on shallow, heavy-textured, and highly erosive soils and on terrace/alluvial fan habitats it is associated with excessively-drained substrates, often of a calcareous nature. Soils have consistently high pH and high conductivity values (within the range found for some *Sarcobatus vermiculatus* communities) and are derived from sedimentary parent materials. In badland settings, occupied slopes range from shallow to steep (>80%) with all aspects represented. For Montana sites the known range of elevation is from 3,000 to 4,700 ft. Landscape position and site parameters have been cursorily described, at best, for the Wyoming and North Dakota occurrences.

VEGETATION DESCRIPTION: The visual aspect of this association, especially where it occurs on badlands and eroded surfaces, is often that of a depauperate shrubland. Though shrub canopy cover for the modal expression of the type is less than the 25% required for a shrubland descriptor, the cover of all other layers is even less, rendering this type a shrubland. *A. tridentata* ssp. *wyomingensis* and *Atriplex confertifolia* constitute from 5 to 25% combined cover, with *A. tridentata* strongly dominant. In the Bighorn Basin and Bighorn Sedimentary Mountains Sections of Montana, other shrubs with greater than 50% constancy (but < < 5% canopy cover) include *Atriplex nuttallii*, *Sarcobatus vermiculatus*, *Ceratoides lanata*, and *Chrysothamnus nauseosus*. Subshrubs *Eriogonum brevicaule* and *E. pauciflorum* are relatively constant on a regional basis. There is little consistency to the composition of the herbaceous layer, which varies site to site and evidences regional variation as well. The graminoids constitute the next most abundant component, but their combined cover usually does not exceed 5%; those grasses with the highest constancy are *Oryzopsis hymenoides*, *Stipa comata*, and *Aristida purpurea*. *Phlox hoodii*, *Sphaeralcea coccinea* and *Opuntia polyacantha* appear to have the highest constancy values, but seldom exceed 1% cover.

If one accepts the descriptions and data reported in three separate papers (Brown 1971, Knight et al. 1987, DeVelice and Lesica 1993) as representing variants of one given type, then there is considerable vegetation, habitat and geographic variability manifest within this type. This community usually occurs as small patches but ranges to large patches on less precipitous terrain. The eastern Montana badland expressions, as well as those of Bighorn Canyon National Recreation Area, tend to have lower total canopy cover (13% average) with widely spaced individuals of the diagnostic species *Artemisia tridentata* (ssp. *wyomingensis*, pers. comm. G. P. Jones 1998) and *Atriplex confertifolia*. Conversely, the Pryor Mountains expressions average upwards of 30% canopy cover for the shrub component alone. A melange of undergrowth forbs is present with the representation depending upon the local flora, however *Opuntia polyacantha* is common to all expressions of the type, as are the grasses, *Oryzopsis hymenoides*, *Aristida purpurea* and *Stipa comata*.

NATURAL DISTURBANCES:

CONSERVATION RANK: G4

RANK JUSTIFICATION: Though the type occurs in small patches and its area of occupancy is small, it is apparently secure due to both its inaccessible landscape position, lack of palatable plants and lack of extractable resources.

MANAGEMENT COMMENTS:

DATABASE CODE: CEGL000993

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CLASS: SHRUBLAND

FORMATION: MICROPHYLLOUS EVERGREEN SHRUBLAND (III.A.4.N.A)
ALLIANCE: ARTEMISIA TRIDENTATA SSP. TRIDENTATA SHRUBLAND ALLIANCE

ARTEMISIA TRIDENTATA SSP. TRIDENTATA / PASCOPYRUM SMITHII SHRUBLAND

COMMON NAME: Basin Big Sagebrush/Western-Wheat Grass

COLLOQUIAL NAME:

COMMUNITY SUMMARY: This is a Big Basin Sagebrush shrub type of stream terraces and other mesic sites west of the Great Plains. Stands occur over an elevation range of 5,900 - 7,875 feet. Most stands grow on alluvial terraces in stream alluvium, although a few occur on upland swales. Soils generally are loamy. Water tables may be within 2 m of the soil surface. The stream channel often is dry and may be incised. Basin big sagebrush (*Artemisia tridentata* ssp. *tridentata*) dominates a shrub layer up to ca. 1.5 m tall, with canopy cover up to *ca.* 35%. The undergrowth, dominated by western wheatgrass (*Pascopyrum smithii*), is poor in species relative to other sagebrush types. *Artemisia tridentata* ssp. *tridentata* forms a dense (to 35% canopy cover) layer of tall shrubs (to ca. 1.5 m). Lower shrubs may be present in small amounts, especially *Chrysothamnus nauseosus* and *C. visicidiflorus*. The undergrowth may be sparse or dense. *Pascopyrum smithii* or *Elymus lanceolatus*, or both, dominate. Other species that may be present in substantial amounts are *Sitanion hystrix* in northern Colorado, *Poa secunda, Muhlenbergia richardsonis,* and *Poa nevadensis* in Nevada, and *Leymus cinereus* and *Poa*

pratensis in Montana. Forbs contribute much less cover than do grasses. Species that often occur are *Aster adscendens* and *Collinsia parviflora* in Nevada, *Penstemon caespitosus* in north-central Colorado, *Achillea millefolium, Erigeron compositus, Senecio canus,* and *Taraxacum officinale* in southwestern Montana, and *Cordylanthus ramosus* in southwestern Wyoming. Mosses and lichens may be important ground cover.

CLASSIFICATION COMMENTS:

SIMILAR COMMUNITIES: The *Sarcobatus vermiculatus* / *Pascopyrum smithii* association occupies soils with more salts. Stands of the *Artemisia tridentata* ssp. *wyomingensis* / *Pascopyrum smithii* association have a shrub layer dominated by that subspecies of big sagebrush, and occupy drier sites. The *Artemisia tridentata* ssp. *tridentata* / *Pseudoroegneria spicata* association generally has a more open shrub layer and an undergrowth dominated by *Pseudoroegneria spicata* rather than *Pascopyrum smithii*; stands of this type grow on shallower soils.

OTHER NAMES: *Poa nevadensis* / *Carex* sp. Habitat Type (Blackburn et al. 1971)|*Artemisia tridentata* / *Agropyron smithii* Community Type (Blackburn et al. 1971)|*Artemisia tridentata* ssp. *tridentata* / *Agropyron smithii* habitat type (Tiedeman et al. 1987).|)|*Artemisia tridentata* ssp. *tridentata* / *Agropyron smithii* habitat type (Strong 1980)|*Artemisia tridentata* ssp. *tridentata* / *Agropyron smithii* community type (Cooper et al. 1995)|*Artemisia tridentata* / *Elytrigia smithii* plant association (Johnston 1987)

RELATION TO OTHER NAMES: +|?|+||+|-|?

COMMENTS ON OTHER NAMES: Blackburn's et al. (1971) *Poa nevadensis / Carex* sp. Habitat Type supports stands of their *Artemisia tridentata* / *Agropyron smithii* Community Type, which apparently belongs to this association (they did not specify the subspecies of *A. tridentata*, but the habitat is similar to that described in reports elsewhere). ||Strong's information on the composition of the vegetation on his habitat type was taken from work that led to Tiedeman's et al. (1987) habitat type description. |Johnston (1987) does not specify the subspecies of big sagebrush.

ECOREGIONAL DISTRIBUTION: 342B:CP|342C:CP|M331H:CC|M332E:CC

STATE DISTRIBUTION: This type has been described from southwestern Wyoming (Jones and Fertig 1996), southwestern Montana (Cooper et al. 1995), north-central Colorado (Tiedeman et al. 1987), and northeastern Nevada (Blackburn et al. 1971). Given the broad geographic ranges of *A. tridentata* ssp. *tridentata* and *Pascopyrum smithii*, it may also occur in Washington, Oregon, and Idaho.

NORTHERN GREAT PLAINS NATIONAL FOREST DISTRIBUTION: This type is unlikely to occur in any of the national grasslands or national forest on the Great Plains because *Artemisia tridentata* ssp. *tridentata* does not occur on the Great Plains (Beetle and Johnson 1982; S. Cooper, Montana Natural Heritage Program, personal communication, 11/11/98)

ENVIRONMENTAL DESCRIPTION: This association occurs over an elevation range of 5,900 - 7,875 feet. Most stands grow on alluvial terraces in stream alluvium, although a few occur on upland swales. Soils generally are loamy. Water tables may be within 2 m of the soil surface (Tiedeman et al. 1987). The stream channel often is dry and may be incised.

VEGETATION DESCRIPTION: *Artemisia tridentata* ssp. *tridentata* forms a dense (to 35% canopy cover) layer of tall shrubs (to ca. 1.5 m). Lower shrubs may be present in small amounts, especially *Chrysothamnus nauseosus* and *C. visicidiflorus*. The undergrowth may be sparse (Tiedeman et al. 1987) or it may be dense (Cooper et al. 1995). *Pascopyrum smithii* or *Elymus lanceolatus* (Cooper et al. 1995, Jones and Fertig 1996), or both, dominate. Other species that

may be present in substantial amounts are *Sitanion hystrix* in northern Colorado (Tiedeman et al. 1987); *Poa secunda*, *Muhlenbergia richardsonis*, *Poa secunda*, and *Poa nevadensis* in Nevada (Blackburn et al. 1971); and *Leymus cinereus*, and *Poa pratensis* in Montana (Cooper et al. 1995). Forbs contribute much less cover than do grasses; species that often occur are *Aster adscendens* and *Collinsia parviflora* in Nevada (Blackburn et al. 1971); *Penstemon caespitosus* in north-central Colorado (Tiedeman et al. 1987); *Achillea millefolium*, *Erigeron compositus*, *Senecio canus*, and *Taraxacum officinale* in southwestern Montana (Cooper et al. 1995); and *Cordylanthus ramosus* in southwestern Wyoming (Jones and Fertig 1996). Mosses and lichens may be important ground cover.

NATURAL DISTURBANCES:

CONSERVATION RANK: G3?

RANK JUSTIFICATION:

MANAGEMENT COMMENTS: Cooper et al. (1995) postulate that the bottomland sites supporting this association are moist enough to support the *Artemisia tridentata* ssp. *tridentata* / *Leymus cinereus* association as well, and that many stands of this type were produced by heavy spring and early summer grazing in the early 1900s that removed *Leymus cinereus*.

DATABASE CODE: CEGL001017

REFERENCES:

Beetle, Alan A. and Kendall L. Johnson. 1982. Sagebrush in Wyoming. University of Wyoming Agricultural Experiment Station Bulletin 779. Laramie WY. 68 pp.

Blackburn, W.H., P.T. Tueller, and R.E. Eckert Jr. 1971. Vegetation and soils of the Rock Springs Watershed. Nevada Agricultural Experiment Station Bulletin R-83. Reno. 116 pp.

Cooper, S.V., P. Lesica, R.L. DeVelice, and J.T. McGarvey. 1995. Classification of southwestern Montana plant communities with emphasis on those of Dillon Resource Area, Bureau of Land Management. Montana Natural Heritage Program, Helena MT. 152 pp.

Jones, George and Walter Fertig. 1996. Plant associations and plant species of special concern in the Jack Morrow Hills Ecosystem. Unpublished report prepared for the Bureau of Land Management Rock Springs District. Wyoming Natural Diversity Database, Laramie WY. 92 pp. + app.

Tiedeman, J.A., R.E. Francis, C. Terwilliger, Jr., and L.H. Carpenter. 1987. Shrub-steppe habitat types of Middle Park, Colorado. USDA Forest Service Research Paper RM-273. Rocky Mountain Forest and Range Experiment Station, Fort Collins CO. 20 pp.

Strong, L.L. 1980. Estimating phytomass production of habitat types on sagebrush steppe. Unpublished thesis, Colorado State University, Fort Collins. 133 pp.

CLASS: SHRUBLAND

FORMATION: MICROPHYLLOUS EVERGREEN SHRUBLAND (III.A.4.N.A)
ALLIANCE: ARTEMISIA TRIDENTATA SSP. VASEYANA SHRUBLAND ALLIANCE

ARTEMISIA TRIDENTATA SSP. VASEYANA - (PURSHIA TRIDENTATA) / PSEUDOROEGNERIA SPICATA SHRUBLAND

COMMON NAME: Mountain Big Sagebrush - Antelope Bitterbrush/Bluebunch Wheatgrass

COLLOQUIAL NAME:

COMMUNITY SUMMARY: This is a common Montain Big Sagebrush shrub vegetation type of the foothills and lower slopes of mountain ranges from the eastern side of the Rocky Mountains to western Idaho and northeastern Nevada on the west, and at least from southern Montana on the north to central Colorado on the south. Stands of this association generally grow on the warmest and driest sites that support *A. tridentata* ssp. *vaseyana* vegetation types. Landscape positions are mainly south- or west-facing slopes, although some stands occur on nearly flat ridge tops. Soils generally are moderately deep to deep, well drained, and of loam, sandy loam, clay loam, or gravelly loam textural classes; often have a substantial volume of coarse fragments, and are derived from a variety of parent materials (although sandstones, limestones, and crystalline rocks predominate). Elevations range from 5,000-6,000 feet in southwestern Montana, 6,500-9,000 feet in Wyoming, 7,000-8,500 feet in northwestern Colorado, and 6,000-10,000 feet in northeastern Nevada.

Artemisia tridentata ssp. *vaseyana* dominates a shrub layer that often is dense and includes a considerable amount of *Purshia tridentata* and smaller amounts of other shrubs, such as *Chrysothamnus nauseosus, C. viscidiflorus, Symphoricarpos oreophilus, Ribes cereum,* and *Rosa woodsii*. The undergrowth generally is moderately dense to dense; grasses contribute more cover than do forbs. *Pseudoroegneria spicata* is the dominant species, and *Poa* spp. (especially *P. secunda*), *Koeleria macrantha, Stipa comata, Balsamorhiza sagittata, Phlox muscoides, P. longifolia, Antennaria* spp., and *Eriogonum* spp. often are present. Stands in the eastern part of the association's geographic range, in Montana, Wyoming, and Colorado, often contain *Bouteloua gracilis* as well. *Festuca idahoensis* and *Melica* spp. are absent or contribute much less cover to the undergrowth than do other species. The sub-shrubs *Gutierrezia sarothrae* and *Artemisia frigida* often are present in the undergrowth.

CLASSIFICATION COMMENTS: This is a new association derived from the *A. tridentata* ssp. *vaseyana - Purshia tridentata* / *Pseudoroegneria spicata* Shrub association (CEGL001032, G5Q, Distr.: NV) combined with *A. tridentata* ssp. *vaseyana*/*Pseudoroegneria spicata* Shrub association (CEGL001030, G5). Some of the references used to define this type clearly describe vegetation with <25% canopy cover, which would place that vegetation in a shrub herbaceous association. No *A. tridentata* ssp. *vaseyana* - (*Purshia tridentata*) / *Pseudoroegneria spicata* shrub herbaceous vegetation has been named, though one may be necessary. It remains unclear how much *Festuca idahoensis* and associated species should be allowed in stands of this association. This question is important to deciding whether the vegetation described from Alberta by Willoughby et al. (1998) (reported by L. Allen [pers. comm.] but not reviewed for this CCA) represents this association.

SIMILAR COMMUNITIES: The *A. tridentata* ssp. *vaseyana - Symphoricarpos oreophilus* / *Pseudoroegneria spicata* shrub association contains stands with substantial amounts of other

shrubs (*S. oreophilus*, *Prunus virginiana*, *Amelanchier alnifolia*, *Ribes cereum*), while this *A. tridentata* ssp. *vaseyana* / *P. spicatum* shrub association lacks those species or contains only small amounts of them. The *A. tridentata* / *Festuca idahoensis* shrub association has an undergrowth with substantial amounts of *F. idahoensis*, and *Melica bulbosa*, while those species are absent or present in small amounts in stands of this *A. tridentata* ssp. *vaseyana* / *P. spicatum* shrub association

OTHER NAMES: *Artemisia tridentata / Agropyron spicatum* (MONT) habitat type (Mueggler and Stewart (1980)|*Artemisia tridentata* ssp. *vaseyana* / *Agropyron spicatum* community type (Cooper et al. 1995)|*Artemisia vaseyana / Agropyron spicatum* habitat type (Hironaka et al. 1983)|*Artemisia tridentata* ssp. *vaseyana* / *Symphoricarpos oreophilus - Agropyron spicatum* habitat type (Bramble-Brodahl 1978)|*Artemisia tridentata* var. *pauciflora - Purshia tridentata* / *Elymus spicatus* plant association (Tart 1996)|*Artemisia tridentata* ssp. *vaseyana* / *Agropyron spicatum* habitat type (Lewis 1975)|*Artemisia tridentata* ssp. *vaseyana* / *Agropyron spicatum* community type (Jensen et al. 1988))|*Artemisia tridentata* ssp. *vaseyana* / *Agropyron spicatum* plant association (Baker and Kennedy 1985)|North Park range resource type (Terwilliger and Smith 1978)|*Artemisia tridentata* / *Roegneria spicata* plant association (Johnston 1987)|*Artemisia tridentata* / *Agropyron* without *Purshia tridentata* type and *Artemisia tridentata - Purshia tridentata* / *Agropyron* type (Current 1984)

RELATION TO OTHER NAMES: +|+|+|+|?|+|-|-|+|+

COMMENTS ON OTHER NAMES: The habitat type of Mueggler and Stewart (1980) also includes stands dominated by *A. tridentata* ssp. *wyomingensis*; the vegetation they describe has a sparse shrub cover and therefore fits into a shrub herbaceous association, but they note that grazing may increase the amount of sagebrush, so stands dense enough to qualify as this association can be expected on their habitat type.|The community type of Cooper and others (1995) includes stands with shrub layers sparse enough to qualify as shrub herbaceous vegetation.||Bramble-Brodahl's (1978) *A. tridentata* ssp. *vaseyana* / *S. oreophilus - A. spicatum* habitat type includes stands with little *Symphoricarpos* spp. That fit into this association and also includes stands that belong in the *A. tridentata* ssp. *vaseyana* - *Symphoricarpos oreophilus* / *Pseudoroegneria spicata* shrub association||Tart (1996) subdivides *A. tridentata* ssp. *vaseyana* into three taxa. *A. tridentata* var. *pauciflora* dominates the lowest-elevation, driest of the stands.|Lewis's (1975) habitat type apparently supports vegetation belonging to other mountain big sagebrush associations.|Baker's and Kennedy's (1985) association contains stands with shrub cover as sparse as 15%, which qualifies as shrub herbaceous vegetation rather than shrub vegetation.|The vegetation of Terwilliger and Smith (1978) is described based on production rather than cover; *A. tridentata* ssp. *vaseyana* contributes only ca. 10% of the production, and that information, combined with a photograph, suggests that the shrub canopy cover is less than 25% and this vegetation is shrub herbaceous vegetation rather than shrub vegetation.|Johnston's (1987) plant association includes vegetation dominated by *A. tridentata* ssp. *wyomingensis*.|Current (1984) includes in his types stands with a range in relative amounts of *A. tridentata* ssp. *vaseyana* and *Purshia tridentata*, from pure sagebrush canopy to pure bitterbrush canopy. He also includes a stand with a scant sagebrush layer.

ECOREGIONAL DISTRIBUTION:
|M331B:CP|M331D:CC|M331E:CP|M331H:CC|M331I:CC|M331J:CC|M332B:CP|M332E:CC342B:CC|341G:PP|342B:CP

STATE DISTRIBUTION: This association has been described from Montana, Wyoming, Colorado, Nevada, Utah, and Idaho. It may also occur in Alberta (L. Allen, pers. comm).

NORTHERN GREAT PLAINS NATIONAL FOREST DISTRIBUTION: This association is unlikely to occur on any national forests or national grasslands of the Northern Great Plains

because *A. tridentata* ssp. *vaseyana* does not extend far enough east (Beetle and Johnson 1982; S. Cooper, Montana Natural Heritage Program, personal communication, 11/11/98)

ENVIRONMENTAL DESCRIPTION: Stands of this association generally grow on the warmest and driest sites that support *A. tridentata* ssp. *vaseyana* vegetation types (Tart 1996, Lewis 1975). Landscape positions are mainly south- or west-facing slopes, although some stands occur on nearly flat ridge tops. Soils generally are moderately deep to deep, well drained, of loam, sandy loam, clay loam, or gravelly loam textural classes, often have a substantial volume of coarse fragments, and are derived from a variety of parent materials (although sandstones, limestones, and crystalline rocks predominate). Elevations range from 5,000-6,000 feet in southwestern Montana, 6,500-9,000 feet in Wyoming, 7,000-8,500 feet in northwestern Colorado, and 6,000-10,000 feet in northeastern Nevada

VEGETATION DESCRIPTION: *Artemisia tridentata* ssp. *vaseyana* usually dominates the shrub layer and may be the only shrub present. *Purshia tridentata* often is present and may contribute as much cover as does the big sagebrush. *Chrysothamnus nauseosus*, *C. viscidiflorus*, *Symphoricarpos oreophilus*, *Ribes cereum*, and *Rosa woodsii* often are present in smaller amounts. The undergrowth generally is moderately dense to dense; grasses contribute more cover than do forbs. *Pseudoroegneria spicata* is the dominant species, and *Poa* spp. (especially *P. secunda*), *Koeleria macrantha*, *Stipa comata*, *Balsamorhiza sagittata*, *Phlox muscoides*, *P. longifolia*, *Antennaria* spp., and *Eriogonum* spp. Often are present. Stands in the eastern part of the association's geographic range, in Montana, Wyoming, and Colorado, often contain *Bouteloua gracilis* as well. *Festuca idahoensis* and *Melica* spp. Are absent or contribute much less cover to the undergrowth than do other species. The sub-shrubs *Gutierrezia sarothrae* and *Artemisia frigida* often are present in the undergrowth.

NATURAL DISTURBANCES: Soils supporting stands of this association often are unstable and prone to mass movement (Bramble-Brodahl 1978).

CONSERVATION RANK: G5

RANK JUSTIFICATION:

MANAGEMENT COMMENTS: Grazing increases the amount of *Poa secunda*, *A. tridentata* ssp. *vaseyana* and (possibly) forbs, and decreases the amount of *Pseudoroegneria spicata* (Baker and Kennedy 1985). In Idaho, *A. tridentata* ssp. *vaseyana* is an important browse species. Retaining a fair abundance of the shrub is a good practice on big game winter ranges. *P. spicata* is palatable and decreases with continued close grazing, while relatively unpalatable forbs such as *Achillea millefolium*, *Microsteris gracilis*, *Collinsia parviflora*, and *Lupinus* spp. increase, as does area of bare ground (Hironaka et al. 1983).

DATABASE CODE: CEGL002673

REFERENCES:

Baker, W.L. and S.C. Kennedy. 1985. Presettlement vegetation of part of northwestern Moffat County, Colorado, described from remnants. Great Basin Naturalist 45:747-777.

Bramble-Brodahl, M.K. 1978. Classification of *Artemisia* vegetation in the Gros Ventre area, Wyoming. M.S. Thesis, University of Idaho, Moscow.

Cooper, S.V., P. Lesica, R.L. DeVelice, and J.T. McGarvey. 1995. Classification of southwestern Montana plant communities with emphasis on those of Dillon Resource Area, Bureau of Land Management. Montana Natural Heritage Program, Helena MT. 152 pp.

Current, F.B. 1984. The distribution and description of the vegetation of Battle Mountain as explained by abiotic factors. Unpublished dissertation, University of Wyoming, Laramie.

Hironaka, M., M.A. Fosberg, and A.H. Winward. 1983. Sagebrush-grass habitat types of southern Idaho. Forestry, Wildlife, and Range Experiment Station Bulletin No. 15, University of Idaho, Moscow. 44 pp.

Jensen, M.E., L.S. Peck, and M.V. Wilson. 1988. Vegetation characteristics of mountainous northeastern Nevada sagebrush community types. Great Basin Naturalist 48 (4): 403-421.

Lewis, Mont E. 1975. Plant communities of the Jarbidge Mountain complex, Humboldt National Forest. USDA Forest Service, Intermountain Region. 18 pp.

Mueggler, W.F. and W.L. Stewart. 1980. Grassland and shrubland habitat types of western Montana. USDA Forest Service General Technical Report INT-66. Intermountain Forest and Range Experiment Station, Ogden UT. 155 pp.

Tart, David L. 1996. Big sagebrush plant associations of the Pinedale Ranger District. Final Review Draft. Bridger-Teton National Forest, Jackson WY. 97 pp.

Terwilliger, C., Jr. and E.L. Smith. 1978. Range resource types in North Park, Colorado. Colorado State University Range Science Department Science Series 32. 48 pp.

Willoughby, M., M.J. Alexander, and K.M. Sundquist. 1998. Range plant community types and carrying capacity for the montane subregion, third approximation. Environmental Protection, Lands and Forest Services, Edmonton, Alberta. 156 pp.

CLASS: SHRUBLAND

FORMATION: MICROPHYLLOUS EVERGREEN SHRUBLAND (III.A.4.N.A)
ALLIANCE: ARTEMISIA TRIDENTATA SSP. WYOMINGENSIS SHRUBLAND ALLIANCE

ARTEMISIA TRIDENTATA SSP. WYOMINGENSIS / PSEUDOROEGNERIA SPICATA SHRUBLAND

COMMON NAME: Wyoming Big Sagebrush/Bluebunch Wheatgrass

COLLOQUIAL NAME: Wyoming Big Sagebrush/Bluebunch Wheatgrass Shrubland

COMMUNITY SUMMARY: This is a widespread Wyoming Big Sagebrush shrub type, extending from the western side of the Great Plains on the east to British Columbia on the west, and south as far as northern Nevada. Stands of this type occupy loamy soils (often with coarse fragments) derived from a variety of parent materials, on middle and lower slopes and in draws. Shrubs are dense and form a canopy with at least 25% cover. *Artemisia tridentata* ssp. *wyomingensis* contributes the most cover to the shrub layer and is often the only shrub present. The height of the sagebrush ranges from ca. 35 cm tall in the eastern part of the range to ca. 1 m tall in the western part. Rabbitbrushes (*Chrysothamnus* spp.) often are present as well. *Pseudoroegneria spicata* contributes more cover to the herbaceous layer than does any other native species, and *Poa secunda* usually is present. Stands in the eastern part of the geographic range often include *Gutierrezia sarothrae*, *Artemisia frigida*, *Bouteloua gracilis*, and *Koeleria macrantha*. Many stands of this community may result from grazing in stands of the *A. tridentata* ssp. *wyomingensis / Pseudoroegneria spicata* Shrub Herbaceous association (q.v.). Grazing increases the cover and density of shrubs and often decreases the cover of grasses, especially of *Pseudoroegneria spicata*. Stands no doubt exist, though, that do not result from grazing. Such stands are likely found in draws and other places on the landscape where soil moisture is sufficient to support a dense shrub canopy, and may represent only a small area on the landscape.

CLASSIFICATION COMMENTS: Assuming that many stands of this association are derived by grazing from the *A. tridentata* ssp. *wyomingensis* / *Pseudoroegneria spicata* Shrub Herbaceous association, this association (like that one) might be split into two sub-associations. The occurrences from the Great Plains west as far as northwestern Colorado, western Wyoming, and western Montana might belong to one type characterized by the presence of *Bouteloua spp.*, *Carex filifolia*, *Koeleria macrantha*, *Gutierrezia sarothrae*, *Artemisia frigida*, and *Opuntia polyacantha*, and by the absence of *Stipa thurberiana*. While the occurrences from southern Idaho, northern Nevada, eastern Oregon, eastern Washington, and British Columbia could belong to a different type characterized by the presence of *Stipa thurberiana*, and by the absence of the other species listed above. The separation between these two types probably would occur in Idaho. Additional research will be required to clarify this issue.

SIMILAR COMMUNITIES: This shrub vegetation type differs from the *A. tridentata* ssp. *wyomingensis* / *Pseudoroegneria spicata* Shrub Herbaceous association in having a denser shrub layer and (often) less cover of graminoids and forbs in the undergrowth. These two types merge, and the difference between them is determined by the criterion of 25% shrub canopy cover used in the National Vegetation Classification Standard (Federal Geographic Data Committee 1997) to differentiate shrublands (Class III) from herbaceous vegetation with a sparse shrub layer (Class V, Group V.A.7). Similarly, stands with sparse vegetation (canopy cover less than 10%) composed mainly of *A. tridentata* ssp. *wyomingensis* and *Pseudoroegneria spicata* (Whitman and Hanson 1939, Brown 1971, Prodgers 1978) may best be place in a sparse vegetation type (Class VII. Of the National Vegetation Classification Standard; Federal Geographic Data Committee 1997). The *A. tridentata* ssp. *tridentata* / *Pseudoroegneria spicata* Shrubland differs from this association in having a shrub layer dominated by basin big sagebrush and in growing in warmer or moister habitats. The *A. tridentata* ssp. *vaseyana* / *Pseudoroegneria spicata* Shrubland differs from this association in having a shrub layer dominated by mountain big sagebrush and in growing in cooler, moister habitats. Stands intermediate between either of those types and this association are common. This association differs from the *A. tridentata* ssp. *wyomingensis* - *Purshia tridentata* / *Pseudoroegneria spicata* Shrubland in having much less *Purshia tridentata* in the shrub layer.

OTHER NAMES: *Artemisia tridentata* / *Pseudoroegneria spicata* Community Type (DeVelice et al. 1991)| *Artemisia tridentata* ssp. *wyomingensis* / *Agropyron spicatum* Community Type (Cooper et al. 1995)|Sagebrush steppe (Knight et al. 1987))|*Artemisia tridentata / Roegneria spicata* Plant Association (Johnston 1987)|*Artemisia tridentata* ssp. *wyomingensis* / *Agropyron spicatum* Habitat type (Jensen et al. 1992

RELATION TO OTHER NAMES: -|-|-|-|+

COMMENTS ON OTHER NAMES:

ECOREGIONAL DISTRIBUTION:
331A:CP|331D:CP|331F:CC|331G:CC|341A:PP|341B:PP|341C:PP|342A:CC|342B:CC|342C:CC|342D:CC|342F:CC|342G:CC|342I:CC|M331A:CC|M331H:CC|M331H☹M322B:CC|M332E:CC

STATE DISTRIBUTION: This association has been described from western North Dakota, eastern Montana (DeVelice et al. 1991), and north-central Wyoming (Knight et al. 1987). It probably occurs over the same range as does the *A. tridentata* ssp. *wyomingensis* / *P. spicata* Shrub Herbaceous association and also occurs in Colorado, Idaho, Washington, Nevada, and British Columbia.

NORTHERN GREAT PLAINS NATIONAL FOREST DISTRIBUTION: This association may occur on the Thunder Basin National Grassland and on the Custer National Forest, Ashland District.

ENVIRONMENTAL DESCRIPTION: The close relationship between this association and the *A. tridentata* ssp. *wyomingensis* / *P. spicata* Shrub Herbaceous association suggest that stands of this type occupy loamy soils (often with coarse fragments) derived from a variety of parent materials, on middle and lower slopes and in draws.

VEGETATION DESCRIPTION: Throughout the geographic range of this type, *Artemisia tridentata* ssp. *wyomingensis* dominates a shrub layer that has at least 25% canopy cover. Rabbitbrushes (*Chrysothamnus* spp.) often are present as well. *Pseudoroegneria spicata* contributes more cover to the herbaceous layer than does any other native species, and *Poa secunda* usually is present. Stands in the eastern part of the geographic range often include *Gutierrezia sarothrae*, *Artemisia frigida*, *Bouteloua gracilis*, and *Koeleria macrantha*. The height of the sagebrush ranges from ca. 35 cm tall in the eastern part of the range to ca. 1 m tall in the western part (Hironaka et al. 1983).

NATURAL DISTURBANCES:

CONSERVATION RANK: G5Q

RANK JUSTIFICATION:

MANAGEMENT COMMENTS: Many stands of this type apparently are derived from the *A. tridentata* ssp. *wyomingensis* / *P. spicata* Shrub Herbaceous association by grazing that causes an increase in the density or cover (or both) of the shrubs.

DATABASE CODE: CEGL001009

REFERENCES:

Baker, W.L. and S.C. Kennedy. 1985. Presettlement vegetation of part of northwestern Moffat County, Colorado, described from remnants. Great Basin Naturalist 45:747-777.

Brown, R.W. 1971. Distribution of plant communities in southeastern Montana badlands. American Midland Naturalist 85)2): 458-477. YY

Cooper, S.V., P. Lesica, R.L. DeVelice, and T. McGarvey. 1995. Classification of southwestern Montana plant communities with emphasis on those of Dillon Resource Area, Bureau of Land Management. Montana Natural Heritage Program, Helen MT. 152 pp.

Daubenmire, R. 1988. Steppe vegetation of Washington. Washington State University Extension Bulletin EB1446. Pullman WA. 131 pp.

DeVelice, R.L., J. Lichthardt, and P.S. Bourgeron. 1991. A preliminary classification of the plant communities of northeastern Montana. Prepared for the Montana Natural Heritage Program, Helena MT. 144 pp.

Hironaka, M., M.A. Fosberg, and A.H. Winward. 1983. Sagebrush-grass habitat types of southern Idaho. Forestry, Wildlife, and Range Experiment Station Bulletin No. 15, University of Idaho, Moscow. 44 pp.

Jensen, M., F. Heisner, J. DiBenedetto, L. Wessman and G. Phillips. 1992. Ecological sites and habitat types of the Little Missouri National Grassland and western North Dakota (Draft II). Custer National Forest, Billings, MT and Northern Region, USDA Forest Service, Missoula, MT. Not paginated.

Johnston, B.C. 1987. Plant associations of Region Two. Edition 4. USDA Forest Service, Rocky Mountain Region. R2-ECOL-87-2. 429 pp.

Knight, D.H., G.P. Jones, Y. Akashi, and R.W. Myers. 1987. Vegetation ecology in the Bighorn Canyon National Recreation Area. Unpublished report prepared for the USDE National Park Service and the Univ. of Wyoming-Nat. Park Service Research Center.

Mueggler, W.F. and W.L. Stewart. 1980. Grassland and shrubland habitat types of western Montana. USDA Forest Service General Technical Report INT-66. Intermountain Forest and Range Experiment Station, Ogden UT. 155 pp.

Prodgers, R. 1978. Circle West vegetation baseline study: final report. Circle West technical report no. 1. Energy Division, Montana Department of Natural Resources and Conservation. Helena MT. 115 pp.

Tisdale, E..W. The grasslands of the southern interior of British Columbia. Ecology 28(4):346-382.

Tweit, S. and K. Houston. 1980. Grassland and shrubland habitat types of the Shoshone National Forest. USDA Forest Service, Rocky Mountain Region, Shoshone National Forest. 143 pp.

Whitman, Warren and Herbert C. Hanson. 1939. Vegetation on scoria and clay buttes in western North Dakota. Ecology 20(3): 455-457.

FORMATION: Temperate or Subpolar Grassland with a Sparse Shrub Layer:
Medium-tall temperate or subpolar grassland with sparse needle-leaved or microphyllous evergreen shrub layer (V.A.7.N.e)

CLASS: HERBACEOUS VEGETATION

FORMATION: MEDIUM-TALL TEMPERATE OR SUBPOLAR GRASSLAND WITH A SPARSE NEEDLE-LEAVED OR MICROPHYLLOUS EVERGREEN SHRUB LAYER (V.A.7.N.E)
ALLIANCE: ARTEMISIA TRIDENTATA SHRUB HERBACEOUS ALLIANCE

ARTEMISIA TRIDENTATA / FESTUCA CAMPESTRIS SHRUB HERBACEOUS VEGETATION

COMMON NAME: Big Sagebrush/Prairie Fescue

COLLOQUIAL NAME: Big Sagebrush/Rough Fescue Shrub Prairie

COMMUNITY SUMMARY: This Big Sagebrush Shrub Prairie type is found in Montana, Washington, southwestern Alberta, and adjacent British Columbia. Stands in Montana are usually found north of 46 °latitude and between 3,400 and 6,400 ft on southerly exposures with less than 40% slope, as well as alluvial flats. Precipitation within this zone ranges from 15 to more than 40 inches. Moderately deep soils are derived from a variety of parent materials. Its distribution outside Montana includes lower elevation sites (to 2,000 ft.) within the Okanogan Valley (Washington) and the Colville country north of Spokane. The high productivity of this type results in comparatively little (< 20%) exposed rock or soil. The vegetation description is based primarily on Montana occurrences. This association usually occurs as a large patches in a mosaic with fescue grasslands and *Pseudotsuga menziesii*- or *Pinus flexilis*-dominated forest.

Shrub layer dominance (10-30% canopy cover, average 20 %) by *Artemisia tridentata* ssp. *vaseyana* characterizes the upper elevation examples of this type. *A. tridentata* ssp. *wyomingensis* has been noted as a canopy dominant in lower elevation occurrences associated with central Montana ranges isolated within the Great Plains. As little as 5% canopy cover of the highly palatable *Festuca campestris* may be diagnostic for the type, but generally it dominates the herbaceous layer, ranging in canopy cover from 10% to as much as 70-80% on the least disturbed, most mesic sites. Other important and high constancy (>75%) grasses are *Festuca idahoensis*, *Koeleria macrantha*, *Pseudoroegneria spicata* and *Poa cusickii*; the cover of *Pseudoroegneria. spicata* and *Festuca idahoensis* may exceed that of *Festuca campestris* on more intensively grazed sites. On overgrazed sites this type may be recognized by scattered remnant clumps of *Festuca campestris*. The forb layer is generally both diverse and abundant, constituting upwards of 20 % of the standing crop biomass; those of high constancy include *Arenaria congesta*, *Eriogonum umbellatum*, *Antennaria microphylla*, *Geranium viscossismum* and *Cerastium arvense*.

CLASSIFICATION COMMENTS: This syntaxa, as now defined, potentially constitutes a combination of vegetation types recognized by the following dominant shrub taxa, *A. tridentata* ssp. *vaseyana*, *A. tridentata* ssp. *wyomingensis*, and even *A tridentata* ssp. *tridentata*, in the most mesic bottomland sites; each subspecies deserves to recognized, whenever possible, at the association level.

The most authoritative source for this syntaxon, Mueggler and Stewart (1980), were well aware that several big sagebrush taxa were involved and that this variability probably accounted for the broad elevational range (3,600 to 6,400 ft) exhibited by the type.

SIMILAR COMMUNITIES: *Artemisia tridentata / Festuca idahoensis* occurs outside the range limits of *F. campestris*, but the abiotic settings and species composition of the two types are very similar.

OTHER NAMES:

RELATION TO OTHER NAMES:

COMMENTS ON OTHER NAMES:

ECOREGIONAL DISTRIBUTION: Province 331, Section D:CC∗ 331E:C?∗ Province M332, Sections B:CC| C:CC| D:CC| E:CP; Province M333, Sections A:CC| B:CC| C:CC| (McNab and Avers 1994)

STATE DISTRIBUTION: This association has been described from Montana, Washington, southwestern Alberta and British Columbia.

NORTHERN GREAT PLAINS NATIONAL FOREST DISTRIBUTION:

ENVIRONMENTAL DESCRIPTION: Within Montana this type is usually found north of 46 ° between 3,400 and 6,400 ft on southerly exposures with less than 40% slope, as well as alluvial flats (Mueggler and Stewart 1980). Precipitation within this zone ranges from 15 to more than 40 inches. Moderately deep soils are derived from a variety of parent materials. Its distribution outside MT includes lower elevation sites (to 2,000 ft.) within the Okanogan Valley (WA) and the Colville country north of Spokane. This types' high productivity results in comparatively little (< 20%) exposed rock or soil.

VEGETATION DESCRIPTION: With the following description based primarily on MT occurrences, this association usually occurs as a large patches in a mosaic with fescue grasslands and *Pseudotsuga menziesii*- or *Pinus flexilis*-dominated forest. Shrub layer dominance (10-30% canopy cover, average 20 %) by *Artemisia tridentata* ssp. *vaseyana* characterizes the upper

elevation examples of this type. *A. tridentata* ssp. *wyomingensis* has been noted as a canopy dominant in lower elevation occurrences associated with central MT ranges isolated within the Great Plains. Mueggler and Stewart (1980) recognized as little as 5% canopy cover of the highly palatable *Festuca campestris* as diagnostic for the type, but generally it dominates the herbaceous layer, ranging in canopy cover from 10% to as much as 70-80% on the least disturbed, most mesic sites. Other important and high constancy (>75%) grasses are *Festuca idahoensis*, *Koeleria macrantha*, *Pseudoroegneria spicata* and *Poa cusickii*; the cover of *P. spicata* and *F. idahoensis* may exceed that of *F. campestris* on more intensively grazed sites. On overgrazed sites this type may be recognized by scattered remnant clumps of *F. campestris*. The forb layer is generally both diverse and abundant, constituting upwards of 20 % of the standing crop biomass; those of high constancy include *Arenaria congesta*, *Eriogonum umbellatum*, *Antennaria microphylla*, *Geranium viscossismum* and *Cerastium arvense*.

NATURAL DISTURBANCES: The herbaceous component of this type is well adapted to periodic burning, but *A. tridentata* is very fire sensitive and must reestablish by seed, which in some cases has been noted to require at least 10 years to regain a foothold in the community and longer yet to reach its former coverage.

CONSERVATION RANK: G3Q

RANK JUSTIFICATION: Stipulating the particular subspecies of *A. tridentata* that is diagnostic for this plant community is crucial to establishing the significance of its association with environment/habitat (and hence its rank).

MANAGEMENT COMMENTS: *Festuca campestris* is characterized as highly palatable to cattle and horses throughout the growing season and also as quite susceptible to prolonged overgrazing (Hodgkinson and Young 1973, Mueggler and Stewart 1980, Willms et al. 1985). The concomitant response to the decrease in cover of *F. campestris*, *F. idahoensis*, and *P. spicata* with overgrazing is an increase in *A. tridentata* cover, apparently not reversible without burning or mechanical reduction.

DATABASE CODE: CEGL001531

REFERENCES:

Hodgkinson, H. S. and A. E. Young. 1973. Rough fescue (*Festuca scabrella* Torr.) in Washington. J. of Range Management 26(1): 25-26.

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Willms, W. D., S. Smoliak and J. F. Dormaar. 1985. Effects of stocking rate on a rough fescue grassland vegetation. Journal of Range Management 38(3): 220-225.

CLASS: Herbaceous Vegetation

FORMATION: MEDIUM-TALL TEMPERATE OR SUBPOLAR GRASSLAND WITH A SPARSE NEEDLE-LEAVED OR MICROPHYLLOUS EVERGREEN SHRUB LAYER (V.A.7.N.E)

ALLIANCE: ARTEMISIA TRIDENTATA SSP. WYOMINGENSIS SHRUB HERBACEOUS ALLIANCE

ARTEMISIA TRIDENTATA SSP. WYOMINGENSIS / PSEUDOROEGNERIA SPICATA SHRUB HERBACEOUS VEGETATION

COMMON NAME: Wyoming Big Sagebrush/Bluebunch Wheatgrass

COLLOQUIAL NAME: Big Sagebrush/Bluebunch Wheatgrass Shrub Prairie

COMMUNITY SUMMARY: This bunchgrass vegetation type with an open Wyoming Big Sagebrush shrub layer occurs in Montana, Wyoming, Colorado, Idaho, Washington, Oregon (apparently), Nevada, and British Columbia. It probably also occurs in western North Dakota and Utah, and it may occur in South Dakota. Stands occur on moderate to steep slopes at low to mid elevations, and on a variety of soils. Throughout the range of this association, the vegetation consists of an open to moderately dense shrub layer (ca. 10% - 25% canopy cover) dominated by *Artemisia tridentata* ssp. *wyomingensis*, and a herbaceous layer dominated by *Pseudoroegneria spicata* with lesser amounts of *Poa secunda* (sometimes a co-dominant grass). From the Great Plains westward to eastern Idaho and south to Colorado, the sagebrush seldom exceeds 0.5 meter in height, but in western Idaho and Washington, the shrubs typically are 1 meter tall. Other shrubs (especially *Chrysothamnus* sp.) and herbaceous species (especially *Stipa comata*) usually are present. *Festuca idahoensis* is absent or present in small amounts. The stands in the eastern half of the geographic range often contain small amounts of *Gutierrezia sarothrae*, *Artemisia frigida*, *Sphaeralcea coccinea*, *Phlox hoodii*, *Koeleria macrantha*, and *Opuntia polyacantha*. Less constant species are *Bouteloua* spp. (especially *B. gracilis*) *Carex filifolia*, and *Pascopyrum smithii*. Missing from these stands is *Stipa thurberiana*. In the western half of the geographic range, the vegetation generally lacks the associated species listed above and often contains *Antennaria dimorpha* and *Stipa thurberiana*. In addition, the stands in Washington often contain large amounts of crustose lichens as ground cover .

CLASSIFICATION COMMENTS: Vegetation types that fit this association have been described from the Great Plains of western North Dakota, eastern Montana, and northeastern Wyoming on the east to southern interior British Columbia on the west, and as far south as northern Nevada and central Colorado. Based on differences in species composition, this association might be split into two associations or sub-associations. The occurrences from the Great Plains west as far as northwestern Colorado, western Wyoming, and western Montana apparently belong to one association characterized by the presence of *Bouteloua spp.*, *Carex filifolia*, *Koeleria* macrantha, *Gutierrezia sarothrae*, *Artemisia frigida*, and *Opuntia polyacantha*, and by the absence of *Stipa thurberiana*. Occurrences from southern Idaho, northern Nevada, eastern Oregon, eastern Washington, and British Columbia might belong to a different type characterized by the presence of *Stipa thurberiana*, and by the absence of the other species listed above. The division between these two associations probably would be made in Idaho.

SIMILAR COMMUNITIES: The *Artemisia tridentata* ssp. *wyomingensis* / *Pseudoroegneria spicata* Shrub association has a thicker sagebrush layer (generally $\geq$ 25% canopy cover) and less relative cover of herbaceous species. The *A. tridentata* ssp. *wyomingensis* / *Poa secunda* Shrub Herbaceous association has an undergrowth dominated by *P. secunda* and containing little *P. spicata*. The *Artemisia tridentata* ssp. *tridentata* /*Pseudoroegneria spicata* Shrub Herbaceous association and the *A. tridentata* ssp. *vaseyana* /*Pseudoroegneria spicata* Shrub Herbaceous association differ in having shrub layers dominated by those subspecies of big sagebrush

OTHER NAMES: *Artemisia tridentata-Agropyron spicatum* Habitat Type (Daubenmire 1988)| A*rtemisia tridentata / Agropyron spicatum* Habitat Type (Hansen and Hoffman 1988)|*Artemisia tridentata / Agropyron spicatum* Habitat Type (Thilenius et al. 1995)| *Artemisia tridentata / Agropyron spicatum* Habitat Type (MONT) (Mueggler and Stewart 1980)|*Artemisia tridentata* ssp. *wyomingensis / Agropyron spicatum* Habitat Type (Tweit and Houston 1980)|*Artemisia tridentata* ssp. *wyomingensis / Agropyron spicatum* Habitat Type (Tiedeman et al. 1987)|*Artemisia tridentata / Agropyron spicatum* Habitat Types (Blackburn 1967)|*Artemisia tridentata / Agropyron spicatum* Community (Blackburn et al. 1968)|*Artemisia tridentata / Agropyron spicatum* Community Type DeVelice and Lesica (1993)|Sagebrush steppe (Knight et al. 1987)|Sagebrush/grass type (Fisser 1964)|*Artemisia tridentata* Zone (McLean 1970)|*Agropyron-Artemisia* or the Lower Grassland Zone (Tisdale 1947)|*Artemisia tridentata* ssp. *wyomingensis* / *Agropyron spicatum* Association (Baker and Kennedy 1985)|*Artemisia wyomingensis / Agropyron spicatum* Habitat Type (Hironaka et al. 1983)|*Artemisia tridentata* ssp. *wyomingensis* / *Agropyron spicatum* Community Type (Cooper et al. 1995)|*Artemisia tridentata / Roegneria spicata* Plant Association (Johnston 1987)|*Artemisia tridentata* / *Agropyron spicatum* association (Eckert 1967).

RELATION TO OTHER NAMES: +|+|+|+|+|+|I|I|-|+|+|+|+|-|+|+|+||?

COMMENTS ON OTHER NAMES: Daubenmire (1988) identified the subspecies of big sagebrush as *A. tridentata* ssp. *tridentata*, but recent review of specimens has indicated that subspecies *A. tridentata* ssp. *wyomingensis* is far more common on this habitat type than is *A. tridentata* ssp. *tridentata*. The latter is largely restricted to draws (R. Crawford, Washington Natural Heritage Program, pers. comm, 12/98). The relationship between this association and Eckert's (1967) *A. tridentata* / *Agropyron spicatum* association is unclear because Eckert does not identify the subspecies of big sagebrush.

ECOREGIONAL DISTRIBUTION:
331A:CP|331D:CP|331F:CC|331G:CC|341A:PP|341B:PP|341C:PP|342A:CC|342B:CC|342C:CC|342D:CC|342F:CC|342G:CC|342I:CC|M331A:CC|M331H:CC|M331H☹M322B:CC|M332E:CC

STATE DISTRIBUTION: This association is known from Montana, Wyoming, Colorado, Idaho, Washington, Oregon (apparently), Nevada, and British Columbia. It probably also occurs in western North Dakota and Utah, and it may occur in South Dakota.

NORTHERN GREAT PLAINS NATIONAL FOREST DISTRIBUTION: This association is known to occur on the Thunder Basin National Grassland and on the Custer National Forest, Ashland District. It may also occur on the Sioux District and the Grand River Districts of the Custer National Forest.

ENVIRONMENTAL DESCRIPTION: On the Great Plains of eastern Montana and Wyoming (Hansen and Hoffman 1988, Thilenius et al. 1995), stands of this association occur on moderately steep to steep (16-45%) slopes and on gentle footslopes with various aspects, at 4,400 - 5,000 feet elevation. Soils are loams, sandy loams, and sandy clay loams, often with coarse fragments in the upper horizons. Stands on the Wyoming plains often are on slopes of sandstone or porcelanite buttes (Thilenius et al. 1995). In the basins and foothills of south-central Montana (DeVelice and Lesica 1993) and north-central and central Wyoming (Fisser 1964, Knight et al. 1987, Tweit and Houston 1980), this association occupies mainly gentle to moderately steep ($\leq$ 35%) slopes at 4,000-6,000 feet elevation. Soils are moderately deep, usually loamy (although one stand has been described from a clay soil), may have a considerable volume of coarse fragments, and have low electrical conductivity. In central and northwestern Colorado, stands of this association occupy gentle to steep slopes (to 65%) on a variety of landforms at elevations from ca. 7,000 - 8,200 feet. Soils are derived from a variety of parent materials and often are gravelly. In southwestern Montana (Mueggler and Stewart 1980, Cooper et al. 1995), stands grow at elevation

from 4,000 - 7,500 feet, on slopes up to 54% with various exposures. Soils are shallow to moderately deep and derived from a variety of parent materials. In eastern Washington (Daubenmire 1988), this association occupies silt loam and sandy loam soils on gentle to moderately steep (8%-38%) slopes with a variety of aspects, up to ca. 2,700 feet elevation. In British Columbia, this type grows on relatively warm, dry sites (Tisdale 1947), generally from 1,300 to 1,970 feet elevation with stands on steep, south-facing slopes occurring as high as 2,950 feet (McLean 1970). Soils are loams, silt loams, and sandy loams.

VEGETATION DESCRIPTION: Throughout the range of this association, the vegetation consists of an open to moderately dense shrub layer (ca. 10% - 25% canopy cover) dominated by *Artemisia tridentata* ssp. *wyomingensis*, and a herbaceous layer dominated by *Pseudoroegneria spicata* with lesser amounts of *Poa secunda* (sometimes a co-dominant grass). Other shrubs (especially *Chrysothamnus* sp.) and herbaceous species (especially *Stipa comata*) usually are present. *Festuca idahoensis* is absent or present in small amounts. The stands in the eastern half of the geographic range often contain small amounts of *Gutierrezia sarothrae*, *Artemisia frigida*, *Sphaeralcea coccinea*, *Phlox hoodii*, *Koeleria macrantha*, and *Opuntia polyacantha*. Less constant species are *Bouteloua* spp. (especially *B. gracilis*) *Carex filifolia*, and *Pascopyrum smithii* (Hansen and Hoffman 1988, Thilenius et al. 1995, Mueggler and Stewart 1980, DeVelice and Lesica 1993, Cooper et al. 1995, Tweit and Houston 1980, Fisser 1964, Knight et al. 1987, Baker and Kennedy 1985, Tiedeman et al. 1987). Missing from these stands is *Stipa thurberiana*. In the western half of the geographic range, the vegetation generally lacks the associated species listed above (although Tisdale (1947) reports *Artemisia frigida* in British Columbia) and often contains *Antennaria dimorpha* and *Stipa thurberiana* (Hironaka et al. 1983, Blackburn 1967, Blackburn et al. 1968, Daubenmire 1988, Tisdale 1947, McLean 1970). In addition, the stands in Washington often contain large amounts of crustose lichens as ground cover. Descriptions and photographs of stands show that shrub height also varies across the range of this type. From the Great Plains westward to eastern Idaho and south to Colorado, the sagebrush seldom exceeds 0.5 meter in height, but in western Idaho and Washington, the shrubs typically are 1 meter tall.

NATURAL DISTURBANCES:

CONSERVATION RANK: G4

RANK JUSTIFICATION:

MANAGEMENT COMMENTS: Heavy grazing generally decreases the amount of *Pseudoroegneria spicata* and *Stipa* spp. In the vegetation, and increases the cover of *A. tridentata* ssp. *wyomingensis* (and other shrubs), *Poa secunda*, *Bouteloua gracilis*, *Bromus tectorum*, *Artemisia frigida*, *Gutierrezia sarothrae*, *Opuntia polyacantha*, and other perennial and annual forbs, and removes the ground cover of cryptograms. Abusive grazing converts the vegetation to an *A. tridentata* ssp. *wyomingensis* shrub layer with an undergrowth of *Poa secunda*, *Bromus tectorum*, and other grazing-resistant species. In Washington, fire and grazing together convert this type to a low grassland of *P. secunda* and *Bromus tectorum*. In Idaho, stands of this association are valuable spring and fall livestock range, and (especially in eastern Idaho) winter range for big game animals and sage grouse; management should strive for a good coverage of *P. spicata* and an open shrub layer (Hironaka et al. 1983). This type is also important spring and fall cattle range in southwestern Montana, but the low coverage of forbs makes it less valuable for sheep (Mueggler and Stewart 1980).

DATABASE CODE: CEGL001535

REFERENCES:

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Tiedeman, J.A., R.E. Francis, C. Terwilliger, Jr., and L.H. Carpenter. 1987. Shrub-steppe habitat types of Middle Park, Colorado. USDA Forest Service Research Paper RM-273. Rocky Mountain Forest and Range Experiment Station, Fort Collins CO. 20 pp.

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Tweit, S. and K. Houston. 1980. Grassland and shrubland habitat types of the Shoshone National Forest. USDA Forest Service, Rocky Mountain Region, Shoshone National Forest. 143 pp.

CLASS: HERBACEOUS VEGETATION

FORMATION: MEDIUM-TALL TEMPERATE OR SUBPOLAR GRASSLAND WITH A SPARSE NEEDLE-LEAVED OR MICROPHYLLOUS EVERGREEN SHRUB LAYER (V.A.7.N.E)
ALLIANCE: ARTEMISIA CANA SHRUB HERBACEOUS ALLIANCE

ARTEMISIA CANA / STIPA COMATA SHRUB HERBACEOUS VEGETATION

COMMON NAME: Silver Sagebrush/Needle-And-Thread

COLLOQUIAL NAME: Silver Sagebrush/Needle-And-Thread Shrub Prairie

COMMUNITY SUMMARY: This Silver Sagebrush Shrub prairie association, which generally occurs in small patches (< one hectare), occurs in the northwestern Great Plains. In Montaina, it is found on benches to gently inclined slopes (30% maximum recorded) in the vicinity of breaklands. Similar habitats (old river terraces, badlands, ravine sideslopes and valley walls) support its occurrence in Alberta). It occurs on various parent materials, but mostly well-drained, often sandy, glacial drift and sandy alluvium. *Artemisia cana* is decidedly the dominant shrub with canopy coverages to 50%, but averaging around 25%, which places it on the cusp of being a true shrub type. *Artemisia frigida* is the only shrub/sub-shrub with greater than 50% constancy and its cover does not exceed 3%. A number of graminoids have high constancy, *Bouteloua gracilis, Carex filifolia, Koeleria macrantha,* and *Poa sandbergii*, but only *Stipa comata* exhibits both 100% constancy and the highest cover values (averaging 38 %). Forbs constitute an insignificant component, virtually none occurring in greater than trace amounts. Those exceeding 50% constancy are *Sphaeralcea coccinea*, *Psoralea argophylla,* and *Gaura coccinea.* This association is hypothesized to represent the driest environment capable of supporting *Artemisia cana*. Most often this association grades to upland range sites dominated by *Stipa comata* and *Bouteloua gracilis* and to the *A. cana / Pascopyrum smithii* or *A. cana / Nasella viridula – P. smithii* associations that occupy more mesic positions on lower floodplain terraces.

CLASSIFICATION COMMENTS: In their vegetation key to this type DeVelice et al. (1995) allow for the occasional dominance of *B. gracilis* and/or *Calamavilfa longifolia*, in lieu of *S. comata* (which is by far the usual case), to be indicative of the association. The cover of *A. cana* ranges widely, spanning the values defining shrub herbaceous and shrub categories. The type is described as shrub herbaceous because the preponderance of stands had cover of less than 25%, though the average cover just exceeded this value. This type could probably be combined with the *A. cana* ssp. *cana / Calamovilfa longifolia* association without compromising the ecological information embedded in either type.

SIMILAR COMMUNITIES: Within the *Artemisia cana / Pascopyrum smithii* and *A. cana / N. viridula –P. smithii* associations rhizomatous wheatgrasses and/or *N. viridula* are dominant or of sufficient cover to indicate a moister habitat than *A. cana / S. comata*. In the Cheyenne River Basin, WY stands of *A. cana / Bouteloua gracilis – Calamovilfa longifolia* (Thilenius et al. 1995, renamed *A. cana* ssp. *cana / C. longifolia* association, G. P. Jones pers. comm.) occur on well-drained sand dunes and lack, or have low coverages *of Pascopyrum smithii*, but support *S. comata* as 100% constant; *S. comata* coverages approach those of the named diagnostic grasses. At least two plots of *A. cana / S. comata* having *Calamovilfa longifolia* dominant could be allocated to *A. cana* ssp. *cana / C. longifolia*.

OTHER NAMES: *Artemisia cana – Stipa comata* community type (DeVelice et al. 1995)| Spear Grass – Sagebrush Association (Envirocan et al. nd.)| Sagebrush / Needle & Thread Site Type (Adams et al. 1997)| Sagebrush flats (Wallis 1976)| *Artemisia cana / Bouteloua gracilis – Calamovilfa longifolia* (Thilenius et al. 1995)| *Artemisia cana* ssp. *cana / C. longifolia* association (G. P. Jones pers. comm.)

RELATION TO OTHER NAMES: =|=|-|+|+|+

COMMENTS ON OTHER NAMES:

ECOREGIONAL DISTRIBUTION: Northwestern Glaciated Plains Section (331D):CC| Northern Glaciated Plains Section (331E)CC| Northwestern Great Plains (331F)CP| Powder River Basin Section (331G)CP

STATE DISTRIBUTION: This association is well documented from Montana and Alberta. The same or a closely analogous type occurs in Wyoming and some permutation of the type is to be expected in northwestern ND and Saskatchewan.

NORTHERN GREAT PLAINS NATIONAL FOREST DISTRIBUTION:

ENVIRONMENTAL DESCRIPTION: It is found on benches to gently inclined slopes (30% maximum recorded value) of rolling prairie, steeper ravine slopes and all manner of topograpy in the vicinity of breaklands. It occurs on various parent materials, but mostly well-drained, often sandy, glacial drift. The ground cover is highly variable with some sites (putatively overgrazed) having a sward of *Selaginella densa* and lichens while others have 70% litter and trace amounts of *S. densa*; only one plot had as much as 10% exposed soil, gravel and rock (combined cover).

VEGETATION DESCRIPTION: *Artemisia cana* (probably *A. cana* ssp. *cana* [Shultz 1984]) is decidedly the dominant shrub with canopy coverages ranging to 50% on heavily grazed sites, but averaging 27%; *Artemisia frigida* is the only shrub/sub-shrub with greater than 50% constancy and its cover did not exceed 3%. A number of graminoids have high constancy, *Bouteloua gracilis*, *Carex filifolia*, *Koeleria macrantha*, and *Poa sandbergii*, but only *Stipa comata* exhibits both 100% constancy and the highest cover values (averaging 38 %). *Muhlenbergia cuspidata* and *Calamovilfa longifolia* had inexplicably high cover on some sites. Forbs constitute an insignificant component, occurring in trace amounts; those exceeding 50% constancy are *Sphaeralcea coccinea*, *Psoralea argophylla* and *Gaura coccinea*. This association is hypothesized to represent the driest environment capable of supporting *Artemisia cana*; most often this association grades to upland ranges sites dominated by *Stipa comata* and *Bouteloua gracilis* and to the *A. cana / Pascopyrum smithii* association that occupies more mesic positions on lower floodplain terraces.

NATURAL DISTURBANCES: The relatively high cover of *Artemisia cana* may be the result of an altered fire regime. During presettlement time, when fires were more frequent, this type might not have attained these shrub densities.

CONSERVATION RANK: G3

RANK JUSTIFICATION: This small patch type currently has a circumscribed geographic distribution, though its description from Saskatchewan and North Dakota would not be unexpected. Habitats with the potential to support this type appear to be relatively abundant, but the type itself is comparatively uncommon. Though embedded in primarily agricultural landscapes, the proximity of this type to breaklands/badlands probably lessens the chances of its being sacrificed to the plow. Its graminoid composition renders it only moderately attractive to cattle and the scarcity of forbs decrease its value as sheep range.

MANAGEMENT COMMENTS: It is conceivable that this type (or portions thereof) could be interpreted as a grazing disclimax resulting from the overgrazing of the *A. cana / P. smithii*

association. However, given that most occurrences of *A. cana / S. comata* in Montana were associated with (or in close physical proximity to) *A. cana / P. smithii*, which occurred lower on the soil catena, there is evidence that this type is in relatively good condition, representing a particular topoedaphic, not a grazing induced, condition.

DATABASE CODE: CEGL001553

REFERENCES:

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FORMATION: Temperate or Subpolar Grassland: Tall sod temperate grassland (includes sod or mixed sod-bunch graminoids) (V.A.5.N.a)

CLASS: HERBACEOUS VEGETATION

FORMATION: TALL SOD TEMPERATE GRASSLAND (V.A.5.N.A)
ALLIANCE: ANDROPOGON HALLII HERBACEOUS ALLIANCE

ANDROPOGON HALLII - CAREX INOPS SSP. HELIOPHILA HERBACEOUS VEGETATION

COMMON NAME: Sand Bluestem - Long-Stolon Sedge Herbaceous Vegetation

COLLOQUIAL NAME: Sand Bluestem - Sedge Sand Prairie

COMMUNITY SUMMARY: This sand bluestem prairie is found in a small area of the northern Great Plains, in southeastern Montana and southeastern North Dakota. It occurs on gently to steeply sloping terrain with sand or sandy loam soil. In Montana, it can occur on slopes of any aspect, but north is the least likely. In North Dakota, it occurs on steep, choppy sands. The vegetation is very open, ranging from 15 to 50% cover. The taller herbaceous strata is dominated by *Andropogon hallii*, with associates of *Calamovilfa longifolia, Stipa comata* and *Sporobolus cryptandrus*. In southeastern North Dakota *Koeleria macrantha, Redfieldia flexuosa*, and *Stipa spartea* are present at low abundance. The lower herbaceous stratum is dominated by *Carex* spp., especially *Carex inops* ssp. *heliophila*. Other species that may be present are *Artemisia frigida, Carex filifolia*, *Carex eleocharis*, *Petalostemum villosum* and *Yucca glauca*. Key diagnostic characteristics include the choppy sand dune habitat, the very open structure of the vegetation, dominance by *Andropogon hallii* with *Carex inops* ssp. *heliophila* and the presence of early successional species, such *as Redfieldia flexuosa.*

CLASSIFICATION COMMENTS: This type occurs only in limited places, and distinction between it and the *Andropogon hallii – Calamovilfa longifolia* type (CEGL001467) are not entirely clear. *Andropogon hallii* occurs in Manitoba, but stands are placed in the *Andropogon hallii – Calamovilfa longifolia* type CEGL001467 (Looman 1980). Stands in southeast North Dakota may contain more tallgrass prairie associates, such as *Andropogon gerardii, Aster ericoides, Lithospermum canescens, Solidago nemoralis*, and *Sporobolus heterolepis*, than those in Montana.

SIMILAR COMMUNITIES: CEGL001470 - *Calamovilfa longifolia - Carex filifolia* Herbaceous Vegetation, CEGL001469 - *Calamovilfa longifolia – Andropogon hallii* Herbaceous Vegetation, CEGL001467 - *Andropogon hallii – Calamovilfa longifolia* Herbaceous Vegetation

OTHER NAMES: Pioneer Sandhill Prairie, Transitional Sandhill Prairie (Burgess 1965) |

RELATION TO OTHER NAMES: F, F |

COMMENTS ON OTHER NAMES: Both the pioneer and transitional types, which have a total vegetation cover of 14% and 27%, respectively, contain more *Andropogon hallii* (>3% cover) than *Calamovilfa longifolia* (<0.7% cover). *Carex inops ssp. heliophila* is not listed for this study, but *Carex pennsylvanica* is, which may have been misidentified |

ECOREGIONAL DISTRIBUTION: 331G Powder River Basin Section:C; 251Ab Souris-Agassiz Stratified Fan Deposits Subsection:C

STATE DISTRIBUTION: ND, MT

NORTHERN GREAT PLAINS NATIONAL FOREST DISTRIBUTION: Sheyenne National Grasslands

ENVIRONMENTAL DESCRIPTION: This type is found on gentle to steep sloping terrain with sand or sandy loam soil. In Montana, it can occur on slopes of any aspect but north is the least likely (MTNHP 1988). In North Dakota, it occurs on steep, choppy sands (Heidl 1984).

VEGETATION DESCRIPTION: The vegetation is very open, ranging from 15 to 50% cover (Burgess 1965). The taller herbaceous strata is dominated by *Andropogon hallii*, with associates of *Calamovilfa longifolia, Stipa comata* and *Sporobolus cryptandrus*. In southeastern North Dakota *Koeleria macrantha, Redfieldia flexuosa*, and *Stipa spartea* are present at low abundance, and *Carex inops.* ssp *heliophila* is not present (Burgess 1965, Nelson *et al*. 1981). The lower herbaceous stratum is dominated by *Carex* spp., especially *Carex inops* ssp. *heliophila*. Other species that may be present are *Artemisia frigida, Carex filifolia, Carex eleocharis, Petalostemum villosum* and *Yucca glauca*.

NATURAL DISTURBANCES: Blowouts may occur in this community type, leading to bare soils or subsoils. Blowouts may be caused by severe droughts and windstorms, and may occur in conjunction with grazing pressures that reduce the ability of the vegetation cover to stabilize the sand. This type may be an early successional stage on these blowouts where vegetation cover and diversity are low (the *Calamovilfa longifolia* - A*ndropogon hallii* Herbaceous Vegetation type, CEGL001469, may be the later successional phase) (Burgess 1965).

CONSERVATION RANK: G3

RANK JUSTIFICATION: This type has a very restricted distribution both geographically, and in terms of site characteristics. Stands are only known from southeastern Montana and southeastern North Dakota, where they are typically less than a hectare in size. A recent rapid ecological assessment of the Northern Great Plains did not turn up any sites for this type, substantiating its restricted nature (Martin et al. 1998). Threats are not known.

MANAGEMENT COMMENTS:

DATABASE CODE: CEGL001466

REFERENCES:

Burgess, R.L. 1965. A study of plant succession in the sandhills of southeastern North Dakota. Proceedings of the North Dakota Academy of Science 19:62-80.

Culwell, L.D. and K.L. Scow. 1982. Terrestrial vegetation inventory: Dominy Project Area, Custer County, Montana 1979-1980. Unpublished technical report for Western Energy Company by Westech, Helena, Montana. 144 pp.

Heidl, B. 1984. Plant community classification of North Dakota. Unpublished manuscript, North Dakota Natural Heritage Program, Bismarck, ND. 19 p.

Looman, J. 1980. The vegetation of the Canadian Prairie Provinces II. The grasslands, part 1. Phytocoenologia. 8(2):153-190.

Martin, B., S. Cooper, B. Heidel, T. Hildebrand, G. Jones, D. Lenz, and P. Lesica. 1998. Natural community inventory within landscapes of the Northern Great Plains Steppe Ecoregion of the United States. The Nature Conservancy, Arlington VA 222 pp.

Montana Natural Heritage Program (MT NHP). 1988. Draft Guide to the natural vegetation of Montana. Montana Natural Heritage Program, Helena. 389 p.

Nelson, W. T., W. T. Barker, and H. Goetz. 1981. Habitat type classification of grasslands of Sheyenne National Grassland of southeastern North Dakota. Completion Report for Cooperative Agreement No. RM-80-139-CA. Unpublished report. 138 pp.

CLASS: HERBACEOUS VEGETATION

FORMATION: TALL SOD TEMPERATE GRASSLAND (V.A.5.N.A)
ALLIANCE: ANDROPOGON HALLII HERBACEOUS ALLIANCE

ANDROPOGON HALLII – CALAMOVILFA LONGIFOLIA HERBACEOUS VEGETATION

COMMON NAME: Sand Bluestem - Prairie Sandreed Herbaceous Vegetation

COLLOQUIAL NAME: Sand Bluestem - Prairie Sandreed Prairie

COMMUNITY SUMMARY: This sand prairie community is found in the northern and central Great Plains. Stands are found on sandy deposits, usually on gentle to moderate slopes, ranging from stabilized rolling to choppy sand dunes. The soil is sand, loamy sand, or sandy loam, often erodible, and somewhat poorly developed. This community is dominated by moderately widely spaced mid- to tall grasses. The most abundant species are *Andropogon hallii* and *Calamovilfa longifolia.* Other graminoids that may be found in this community include *Bouteloua gracilis, Bouteloua hirsuta, Carex eleocharis, Carex filifolia, Carex inops* ssp. *heliophila, Eragrostis trichodes, Stipa comata, Koeleria macrantha, Muhlenbergia pungens, Redfieldia flexuosa,* and *Schizachyrium scoparium.* Forbs and shrubs are a minor component of the total vegetation. Characteristic forbs include *Chenopodium subglabrum, Euphorbia serpyllifolia, Helianthus pauciflorus, Lappula occidentalis* var. *occidentalis, Liatris punctata, Lithospermum incisum, Lygodesmia juncea, Penstemon haydenii* (in Nebraska), and *Psoralidium lanceolatum. Artemisia frigida* and *Yucca glauca* are the most common shrubs, especially on wind-blow dune crests and choppy slopes in Nebraska sandhills. In southeastern North Dakota, a subtype containing tallgrass species may be distinct; species include *Andropogon gerardii, Aster ericoides, Lithospermum canescens, Solidago nemoralis,* and *Sporobolus heterolepis.*

CLASSIFICATION COMMENTS: This type may vary from north to south and east to west. Its more northern stands may have higher dominance by *Carex filifolia* or *Carex inops* ssp. *heliophila*. Distinctions between this type and the *Andropogon hallii – Carex inops ssp. heliophila* Herbaceous Vegetation type (CEGL001466) are not entirely clear. Note that Looman (1980) describes this type for Manitoba, but these northern stands also contain *Carex foenea, Danthonia spicata,* and *Festuca ovina*. Currently the North Dakota Heritage Program restricts this type primarily to the tallgrass prairie region of the state, where sands are deep, as described in part by Burgess (1965); however, it is reported further west in southwest North Dakota (Hirsch 1985) and Montana. Range-wide application of this type needs further review. In Minnesota, relatively small *Calamovilfa longifolia*-dominated patches can occur in dry sand prairies or barrens, particularly on crests of dunes, but these are treated as part of CEGL005204 – the *Schizachyrium scoparium – Stipa spartea – Bouteloua (curtipendula, gracilis)* Herbaceous Vegetation). *Andropogon hallii* does not occur as a native species in Minnesota.

Steve Kettler (personal communication 1998) indicated that this association probably does not occur in Colorado even though they once tracked it. All of their sandhill types contain *Artemisia filifolia* and are classified (or will be reclassified) as *Artemisia filifolia*/*Andropogon hallii*. NRCS range sites say abundance of *Artemisia filifolia* should be low, but he think's it is always present, otherwise the vegetation and environment are similar. He suggested that the presence or absence of *Artemisia filifolia* seems to make a good split between the southern (CO and south and east) and northern (NE and north) sandhills.

SIMILAR COMMUNITIES: CEGL001469 – *Calamovilfa longifolia - Andropogon hallii* Herbaceous Vegetation, CEGL001466 - *Andropogon hallii – Carex inops. Ssp. heliophila*

Herbaceous Vegetation type, CEGL005204 – *Schizachyrium scoparium – Stipa spartea – Bouteloua (curtipendula, gracilis)* Herbaceous Vegetation.

OTHER NAMES: Climax Sandhill Prairie (Burgess 1965) | Andropogon hallii – Calamovilfa longifolia habitat type (Hirsch 1985)

RELATION TO OTHER NAMES: = | =

COMMENTS ON OTHER NAMES: Type contains equal amounts of *Andropogon hallii* and *Calamovilfa longifolia,* vegetation cover is high, and diverse | Hirsch's type seems to fit this type pretty well, since her type contains equal amounts of *Andropogon hallii* and *Calamovilfa longifolia,* vegetation cover is high (> 90%), species diversity is moderate, and the type occurs on thin, erodable sands.

ECOREGIONAL DISTRIBUTION: 251Ab:?, 331C:C, 331D:C, 331E:C, 331G:C, 331H:C, 331I:C, 332A:?, 332C:C, 332D:?, 332E:?

STATE DISTRIBUTION: KS, MB, MT, NE, ND, SD, SK

NORTHERN GREAT PLAINS NATIONAL FOREST DISTRIBUTION: Sheyenne National Grasslands

ENVIRONMENTAL DESCRIPTION: This community is found on sandy deposits, usually on gentle to moderate slopes (Johnston 1987). The soil is sand, loamy sand, or sandy loam and often erodible. Hirsch (1985) reported that stands of this type in southwestern North Dakota were small, generally less than 400 m^2.

VEGETATION DESCRIPTION: This community is dominated by moderately widely spaced mid- to tallgrasses. The most abundant species are *Andropogon hallii* and *Calamovilfa longifolia.* Other graminoids that may be found in this community include *Bouteloua gracilis, Bouteloua hirsuta, Carex eleocharis, Carex filifolia, Carex inops* ssp. *heliophila, Eragrostis trichodes, Stipa comata, Koeleria macrantha, Muhlenbergia pungens, Redfieldia flexuosa,* and *Schizachyrium scoparium.* Forbs and shrubs are a minor component of the total vegetation. Characteristic forbs include *Chenopodium subglabrum, Euphorbia serpyllifolia, Helianthus pauciflorus, Lappula occidentalis* var. *occidentalis, Liatris punctata, Lithospermum incisum, Lygodesmia juncea, Penstemon haydenii* (in Nebraska), and *Psoralidium lanceolatum. Artemisia frigida* and *Yucca glauca* are the most common shrubs, especially on wind-blow dune crests and choppy slopes in Nebraska sandhills (Steinauer and Rolfsmeier 1997). On eroding parts of the Nebraska Sandhills a number of different species may occur, including *Chamaesyce geyeri, Chamaesyce missurica, Chenopodium berlandieri, Chenopodium pratericola, Cycloloma atriplicifolium, Erigeron bellidiastrum, Eriogonum annuum Froelichia floridana var campestris, Ipomopsis longiflora,* and *Linum rigidum. Redfieldia flexuosa* is common in blowouts (Steinauer and Rolfsmeier 1997). In southeastern North Dakota, a subtype containing tallgrass species may be distinct; species include *Andropogon gerardii, Aster ericoides, Lithospermum canescens, Solidago nemoralis,* and *Sporobolus heterolepis* (Burgess 1965).

NATURAL DISTURBANCES: Blowouts may occur in this community type, leading to bare soils or subsoils. Blowouts may be caused by severe droughts and windstorms, and may occur in conjunction with grazing pressures that reduce the ability of the vegetation cover to stabilize the sand. This type may be a later successional stage on these blowouts where sands have been stabilized and vegetation cover and diversity are high (the *Andropogon hallii – Carex inops. Ssp. heliophila* Herbaceous Vegetation type, CEGL001466, may be the early successional phase, at least in the northern states) (Burgess 1965).

CONSERVATION RANK: G3G5

RANK JUSTIFICATION: This type has a relatively restricted distribution in terms of site characteristics, but has a wide distribution in the northern Great Plains. Stands are typically less than a few hectares in size in the northern parts of the range, but can be quite extensive in the Nebraska Sandhills. Threats are not known.

MANAGEMENT COMMENTS:

DATABASE CODE: CEGL001467

REFERENCES:

Burgess, R.L. 1965. A study of plant succession in the sandhills of southeastern North Dakota. Proceedings of the North Dakota Academy of Science 19:62-80.

Greenall, J. A. 1995. Draft element descriptions for natural communities of southern Manitoba (prairie and parkland regions). Manitoba Conservation Data Centre, Winnipeg. 17p.

Hirsch, K.J. 1985. Habitat type classification of grasslands and shrublands of southwestern North Dakota. Ph.D. Thesis. NDSU, Fargo, ND.

Johnston, B. C. 1987. Plant associations of region two: potential plant communities of Wyoming, South Dakota, Nebraska, Colorado, and Kansas. R2-ECOL-87-2. U. S. Dep. Agric., For. Serv., Rocky Mt. Reg. Lakewood, Colo. 429 p.

Looman, J. 1980. The vegetation of the Canadian Prairie Provinces II. The grasslands, part 1. Phytocoenologia. 8(2):153-190.

Steinauer, G. and S. Rolfsmeier. 1997. Terrestrial natural communities of Nebraska. Draft - October 28, 1997. Nebraska Game and Parks Commission, Lincoln, NE. 117 p.

CLASS: HERBACEOUS VEGETATION

FORMATION: TALL SOD TEMPERATE GRASSLAND (V.A.5.N.A)
ALLIANCE: CALAMOVILFA LONGIFOLIA HERBACEOUS ALLIANCE

CALAMOVILFA LONGIFOLIA - CAREX INOPS SSP. HELIOPHILA HERBACEOUS VEGETATION

COMMON NAME: Prairie Sandreed-Long-Stolon Sedge

COLLOQUIAL NAME: Prairie Sandreed - Thread-Leaved Sedge Prairie

COMMUNITY SUMMARY: This prairie sandreed grassland is found in the northwestern Great Plains. Stands typically occur on gentle slopes but can also be found on flat land or moderate to steep slopes. Soils are thin sands, sandy loams, and loamy sands, in places derived from sandstone. Moisture levels may be high deeper in the soil profile. Most stands of this community are not very large. The vegetation is dominated by graminoids, with two strata, one of mid to tall grasses, the other of dense short sedges. Shrubs are uncommon. In the taller grass layer, the most abundant species is *Calamovilfa longifolia*. Other species found in this layer include *Koeleria macrantha, Schizachyrium scoparium*, and *Stipa comata*. *Agropyron smithii* may be present on some stands with finer soil textures. The short graminoid layer is composed chiefly of *Carex filifolia* and *Carex inops* ssp. *heliophila,* which may have high cover values. Other upland *Carices*, such as *Carex eleocharis* and *Carex duriuscula,* as well as *Bouteloua gracilis* and

Muhlenbergia pungens, may also be present. Forb species diversity is moderate but they do not contribute greatly to the cover. The forbs that are typical of this community include *Artemisia dracunculus, Artemisia frigida, Artemisia ludoviciana, Chenopodium album, Chenopodium leptophyllum, Lathyrus* spp.*, Liatris punctata, Lygodesmia juncea, Phlox hoodii,* and *Psoralidium lanceolatum*.

CLASSIFICATION COMMENTS: This type description represents the merging of three types, the *Calamovilfa longifolia – Carex inops ssp. filifolia* Herbaceous Vegetation (CEGL001470), the *Calamovilfa longifolia – Pascopyrum smithii* Herbaceous Vegetation (CEGL001472), and this type. The name should be changed to *Calamovilfa longifolia - Carex inops ssp. filifolia - Carex filifolia* Herbaceous Vegetation. *Carex filifolia* occurs on a wider variety of substrates than does *Carex inops spp. heliophila,* which is more restricted to lighter sands. Steve Cooper (personal communication 1998) also notes that *Carex filifolia* occurs further north and west in MT than does *Carex inops ssp. heliophila.* In MT, *Carex inops ssp. heliophila* also occurs on shales that have been weathered to sand particles. In North Dakota, this type is restricted to the western part of the state.

SIMILAR COMMUNITIES: CEGL001469 - *CALAMOVILFA LONGIFOLIA* - *ANDROPOGON HALLII* HERBACEOUS VEGETATION, CEGL001473 - *CALAMOVILFA LONGIFOLIA* - *STIPA COMATA* HERBACEOUS VEGETATION

OTHER NAMES: Calamovilfa longifolia/Carex heliophila (Hansen and Hoffman 1988) | Calamovilfa longifolia habitat type (Hirsch 1985)

RELATION TO OTHER NAMES: = | =

COMMENTS ON OTHER NAMES: | Hirsch reports variable abundances of both *Carex heliophila* and *Carex filifolia* in this type, with the latter species more constant.

ECOREGIONAL DISTRIBUTION: 331D Northwestern Glaciated Plains Section: C, 331E Northern Glaciated Plains Section:?, 331F Northwestern Great Plains Section:C, 331G Powder River Basin Section:C

STATE DISTRIBUTION: MT, ND, SD, SK, WY

NORTHERN GREAT PLAINS NATIONAL FOREST DISTRIBUTION:

ENVIRONMENTAL DESCRIPTION: This community is found on sandy uplands and slopes up to 39%. Most sites are on slopes between 0 and 20% (Hirsch 1985, Hansen and Hoffman 1988). The soils are sand, sandy loam, or loamy sand and there is rarely substantial soil horizon development (Hanson and Whitman 1938). The parent material is sandstone (USFS 1992). Moisture levels may be high deep in the profile.

VEGETATION DESCRIPTION: This community contains a moderate amount of open space between the plants, with cover averaging 65% in parts of its range (USFS 1992). The vegetation is dominated by graminoids, with two strata, one of mid to tall grasses, the other of dense short sedges. In the taller grass layer, the most abundant species is *Calamovilfa longifolia*. Other species found in this layer include *Koeleria macrantha, Schizachyrium scoparium*, and *Stipa comata*. *Agropyron smithii* may be present on some stands with finer soil textures. The short graminoid layer is composed chiefly of *Carex filifolia* and *Carex inops* ssp. *heliophila,* which may have high cover values. Other upland *Carices*, such as *Carex eleocharis* and *Carex duriuscula*, as well as *Bouteloua gracilis* and *Muhlenbergia pungens*, may also be present. Forb species diversity is moderate but they do not contribute greatly to the cover cover (Hanson and Whitman 1938, USFS 1992). The forbs that are typical of this community include *Artemisia dracunculus, Artemisia frigida, Artemisia ludoviciana, Chenopodium album, Chenopodium*

leptophyllum, Lathyrus spp., Liatris punctata, Lygodesmia juncea, Phlox hoodii, and *Psoralidium lanceolatum*. Shrubs are uncommon. When shrubs are present they are short shrubs such as *Yucca glauca, Rosa spp.*, and *Artemisia frigida* (a shrub by some authors; also listed as a forb above).

NATURAL DISTURBANCES:

CONSERVATION RANK: G3

RANK JUSTIFICATION:

MANAGEMENT COMMENTS:

DATABASE CODE: CEGL001470

REFERENCES:

Hansen, P. L., and G. R. Hoffman. 1988. The vegetation of the Grand River/Cedar River, Sioux, and Ashland Districts of the Custer National Forest: A habitat type classification. U. S. Dep. Agric., For. Serv., Rocky Mt. For. & Range Exp. Sta. Gen. Tech. Rep. RM-157. Fort Collins, Colo. 68 p.

Hanson, H. C., and W. Whitman. 1938. Characteristics of major grassland types in western North Dakota. Ecol. Monogr. 8(1):57-114.

Hirsch, K.J. 1985. Habitat type classification of grasslands and shrublands of southwestern North Dakota. Ph.D. Thesis. NDSU, Fargo, ND.

Johnston, B. C. 1987. Plant associations of region two: potential plant communities of Wyoming, South Dakota, Nebraska, Colorado, and Kansas. R2-ECOL-87-2. U. S. Dep. Agric., For. Serv., Rocky Mt. Reg. Lakewood, Colo. 429 p.

United States Forest Service. 1992. Draft habitat types of the Little Missouri National Grasslands. Medora and McKenzie Ranger Districts, Custer National Forest. Dickinson, ND.

CLASS: HERBACEOUS VEGETATION

FORMATION: TALL SOD TEMPERATE GRASSLAND (V.A.5.N.A)
ALLIANCE: CALAMOVILFA LONGIFOLIA HERBACEOUS ALLIANCE

CALAMOVILFA LONGIFOLIA - STIPA COMATA HERBACEOUS VEGETATION

COMMON NAME: Prairie Sandreed-Needle-And-Thread

COLLOQUIAL NAME: Prairie Sandreed - Needle-And-Thread Prairie

COMMUNITY SUMMARY: This prairie sandreed grassland community type occurs in the central/northern Great Plains region on stabilized sand dunes, as well as in interdunal valleys, and colluvial sands. Soils are medium to fine sands formed either from eolian or colluvial processes. The vegetation has an open canopy, dominated by mid- to tall grasses. *Calamovilfa longifolia* and *Stipa comata* are the most conspicuous and dominant grasses. Other common grasses include *Bouteloua gracilis, Koeleria macrantha, Oryzopsis hymenoides, Sporobolus cryptandrus.* The type may grade into stands dominated by *Pascopyrum smithii* and *Stipa viridula* at the base of slopes. *Andropogon hallii* may also be present at low cover levels. Sedges are rare, but could include *Carex inops ssp. heliophila*. Forb diversity ranges from low to moderate, depending on the site. Dry valley sand prairies may be particularly forb rich. Shrubs are scattered and infrequent to absent, with *Rhus trilobata* the most common species. These areas are highly susceptible to invasion by exotic brome grasses (*Bromus japonicus, Bromus squarrosus, Bromus tectorum*) and may be quite weedy.

CLASSIFICATION COMMENTS: For distribution, Saskatchewan was removed from this type, until further review is completed, and Nebraska was added to this type. This type may perhaps be differentiated from other types, such as CEGL001471, by the absence or low abundance of *Carex filifolia* and *Carex inops ssp. heliophila,* though why those species are not abundant in this type is not clear. Further floristic comparisons need to be made to help make the distinction clear between this type and CEGL001471. Some floristic variability is to be expected in this type, based on successional patterns following dune blowouts.

Steve Kettler (personal communication 1998) says they don't have this type in Colorado. He suspects that a lot of the variation we see in grass dominance is from different management (grazing) over the years.

SIMILAR COMMUNITIES: CEGL001471 - *Calamovilfa longifolia – Carex inops ssp. heliophila* Herbaceous Vegetation type

OTHER NAMES: Sandhills Grassland (U.S. Department of Interior 1979)| Sandhills Rangelands (Heerwagen 1958)| Calamovilfa longifolia / Stipa comata (Thilenius et al. 1995) | Calamovilfa longifolia/Stipa comata (Johnston 1987) | Valley habitat type (Barnes et al. 1984)

RELATION TO OTHER NAMES: B |B | =| B| =

COMMENTS ON OTHER NAMES: The sandhills grassland type is defined fairly broadly | The sandhills rangeland type may be either a *Andropogon hallii* type or a *Calamovilfa longifolia* type or both | This type is only listed on the preliminary list of types identified during reconnaissance. It is not described further. | Johnston appears to include CEGL001471 in this type as well, since his range covers the Dakotas and Manitoba |

ECOREGIONAL DISTRIBUTION: 331F Northwestern Great Plains Section:C, 332C Nebraska Sandhills Section:C

STATE DISTRIBUTION: NE, WY

NORTHERN GREAT PLAINS NATIONAL FOREST DISTRIBUTION: Thunder Basin National Grasslands

ENVIRONMENTAL DESCRIPTION: Stands occur on stabilized sand dunes, as well as in interdunal valleys or draws, and colluvial sands. Soils are medium to fine sands formed either from eolian or colluvial processes (Heerwagen 1958, USDI 1979, Barnes et al. 1984, Steinauer and Rolfsmeier 1997).

VEGETATION DESCRIPTION: The vegetation has an open canopy, dominated by mid- to tall grasses. *Calamovilfa longifolia* is the most conspicuous grass. Other common grasses include *Bouteloua gracilis, Bouteloua gracilis, Koeleria macrantha, Oryzopsis hymenoides, Sporobolus cryptandrus,* and *Stipa comata*. *Agropyron smithii* and *Stipa viridula* may occur on more level sites at the base of slopes (Barnes et al. 1984, Steinauer and Rolfsmeier 1997). *Andropogon hallii* may also be present. Sedges are rare, but could include *Carex inops ssp. heliophila*. Forb diversity ranges from low to moderate, depending on the site. Dry valley sand prairies may be particularly forb rich. Shrubs are scattered and infrequent to absent, with *Rhus trilobata* the most common species. These areas are highly susceptible to invasion by exotic brome grasses (*Bromus japonicus, Bromus squarrosus, Bromus tectorum*) and may be quite weedy (Heerwagen 1958, USDI 1979, Steinauer and Rolfsmeier 1997).

NATURAL DISTURBANCES: Blowouts caused by drought and wind may occur in this type. The type probably represents a later successional stage. Earlier stages may be dominated by *Andropogon hallii* (e.g. CEGL001467) Heavy grazing may increase the likelihood of blowouts.

CONSERVATION RANK: G3

RANK JUSTIFICATION: This type has a relatively restricted distribution in terms of site characteristics, but has a moderately wide distribution in the central to northern Great Plains. Stands are typically less than a few hectares in size. In Nebraska, this community can be heavily grazed and subsequently invaded by exotic species (Steinauer and Rolfsmeier 1997).

MANAGEMENT COMMENTS: Heavy grazing may eliminate or greatly reduce the dominance of the taller grasses (Heerwagen 1958). These areas are highly susceptible to invasion by exotic brome grasses (*Bromus japonicus, Bromus squarrosus, Bromus tectorum*) and may be quite weedy (Steinauer and Rolfsmeier 1997).

DATABASE CODE: CEGL001473

REFERENCES:

Barnes, P.W., A.T. Harrison, S.P. Heinisch. 1984. Vegetation patterns in relation to topography and edaphic variation in Nebraska Sandhills Prairie. Prairie Naturalist 16: 145-158.

Heerwagen, A. 1958. Management as related to range site in the central plains of eastern Colorado. Journal of Range Management 11:5-9.

Johnston, B. C. 1987. Plant associations of region two: potential plant communities of Wyoming, South Dakota, Nebraska, Colorado, and Kansas. R2-ECOL-87-2. U. S. Dep. Agric., For. Serv., Rocky Mt. Reg. Lakewood, Colo. 429 p.

Steinauer, G. and S. Rolfsmeier. 1997. Terrestrial natural communities of Nebraska. Draft - October 28, 1997. Nebraska Game and Parks Commission, Lincoln, NE. 117 p.

USDI Bureau of Land Management. 1979. Final environmental impact statement, proposed development of coal resources in Eastern Powder River, Wyoming. 67 pp.

FORMATION: Medium-tall bunch temperate or subpolar grassland (includes sod or mixed sod-bunch graminoids) (V.A.5.N.c)

CLASS: HERBACEOUS VEGETATION

FORMATION: MEDIUM-TALL SOD TEMPERATE OR SUBPOLAR GRASSLAND (V.A.5.N.C)
ALLIANCE: PASCOPYRUM SMITHII HERBACEOUS ALLIANCE

PASCOPYRUM SMITHII - BOUTELOUA GRACILIS - CAREX FILIFOLIA HERBACEOUS VEGETATION

COMMON NAME: Western Wheatgrass - Blue Grama - Threadleaf Sedge Herbaceous Vegetation

COLLOQUIAL NAME: Western Wheatgrass - Blue Grama - Thread-Leaved Sedge Prairie

COMMUNITY SUMMARY: The *Pascopyrum smithii - Bouteloua gracilis - Carex filifolia* Herbaceous Vegetation is common throughout much of the northern and northwestern Great Plains on flat or gently sloping terrain. The soils are clay loam, silt loam, or loam and usually deep and fertile. This community is dominated by medium and short graminoids. The midgrass stratum is dominated by *Pascopyrum smithii* or *Elymus lanceolatus*, which are difficult to distinguish from one another and which apparently have overlapping ecological niches. Common associates include *Koeleria macrantha, Stipa comata,* and *Nassella viridula*. *Stipa comata* is common particularly on the upper slopes and drier upland sites with sandier soils, while *Nassella viridula* is present in small amounts on the lower slopes and floodplains with finer-textured soils. The most common short graminoid is *Bouteloua gracilis*; *Carex filifolia* often occurs but the amount of cover it contributes varies widely, and it may be absent. Other short upland sedges, such as *C. inops* ssp. *heliophila, C. eleocharis,* and *C. pensylvanica,* may also be found. Forbs contribute little of the canopy cover but they are scattered throughout this community. Typical forbs are *Tragopogon dubius, Gaura coccinea, Hedeoma hispida, Sphaeralcea coccinea,* and *Phlox hoodii*.

CLASSIFICATION COMMENTS: Almost any combination of *Pascopyrum smithii, Bouteloua gracilis, Carex filifolia,* and *Stipa comata* can be found in the northern and northwestern Great Plains, and the relative amounts of these species apparently depend at least in part on soil texture and grazing history. Moreover, drought or wet weather can cause the relative amounts of these species in one stand to change markedly in a few years (Ellison and Woolfolk 1937, Weaver and Albertson 1956). Consequently, differentiating between plant associations based solely on the relative amounts of these species is extremely difficult. This *P. smithii - B. gracilis - C. filifolia* association is found on soils in textural classes finer than loam in which *P. smithii* and/or *Elymus lanceolatus* (which is similar morphologically and ecologically) contribute at least as much cover as does *Stipa comata. B. gracilis* usually is present, often contributing as much cover as do *P. smithii* or *E. lanceolatus* and sometimes contributing more; and *C. filifolia* usually is present, sometimes with considerable cover. Any one of these species may be absent from areas of several acres, so an area of at least several acres should be examined to determine whether the vegetation belongs to this association. This association shares major graminoid species with the *Stipa comata - Bouteloua gracilis - Carex filifolia* association (CEGL002037) but in the latter association, *S. comata* contributes more cover than do *P. smithii* or *E. lanceolatus,* and the latter association grows on soils of loam or coarser textural classes.

SIMILAR COMMUNITIES: The difference between the *Pascopyrum smithii - Bouteloua gracilis - Carex filifolia* association and the *Pascopyrum smithii - Bouteloua gracilis* herbaceous association is unclear, and these two names may refer to the same association. It may be useful to reserve the name *Pascopyrum smithii - Bouteloua gracilis* for vegetation of the central and southern Great Plains (south of Colorado and Nebraska), where *Carex filifolia* is present in the regional flora but is a minor species ecologically (Weaver and Albertson 1956). In the

Pascopyrum smithii - Nassella viridula herbaceous association, *N. viridula* contributes at least 10% of the herbaceous cover, and other indicators of mesic sites (*Poa juncifolia, Poa pratensis, Achillea millefolium*) contribute substantial cover. In the *Stipa comata - Bouteloua gracilis - Carex filifolia* association, which grows on coarser soils (usually silt loams and sandy loams), *Stipa comata* contributes at least as much cover as does *Pascopyrum smithii*.

OTHER NAMES: *Bouteloua gracilis* sodgrass steppe (Thilenius et al. 1995)|Western wheatgrass-grama-sedge type (Hanson and Whitman 1938|*Agropyron smithii* / *Carex filifolia* habitat type (Hansen et al. 1984)| *Agropyron smithii* / *Carex filifolia* habitat type (Hansen and Hoffman 1988)|*Agropyron smithii* community (Quinnild and Cosby 1958)|Northwestern mixed-grass prairie (Steinauer and Rolfsmeier 1997)|Short-grass type (Costello 1944)|*Pascopyrum smithii* / *Bouteloua gracilis* plant community (DeVelice et al. 1991).|Mixed Prairie Association, *Bouteloua - Agropyron* Faciation (Coupland 1961)|*Elytrigia smithii* / *Bouteloua gracilis* plant association (Johnston 1987)|*Elytrigia smithii* / *Carex filifolia* plant association (Johnston 1987)

RELATION TO OTHER NAMES: -|=|+|+|=|+|?|-|-|?|?

COMMENTS ON OTHER NAMES: The *B. gracilis* shortgrass steppe of Thilenius et al. (1995) includes stands in which *B. gracilis* contributes more cover than does *P. smithii*, but the latter is the sub-dominant species.|Hanson's and Whitman's (1938) type illustrates the central concept of this association.|The habitat type of Hansen et al. (1984) supports stands of this association in western North Dakota.|The habitat type of Hansen and Hoffman (1988) supports stands of this association in eastern Montana, northwestern South Dakota, and the southwestern corner of North Dakota.|Quinnild's and Cosby's (1958) community illustrates this association in western North Dakota.|Steinauer's and Rolfsmeier's (1997) northwestern mixed-grass prairie includes stands of this association without *S. comata* in northwestern Nebraska, but it is unclear if their clay pan prairie sub-type belongs to this association.|Costello's (1944) short-grass type apparently includes stands of this association, but he may be describing only stands of a *Bouteloua gracilis* type.|The *P. smithii* / *B. gracilis* community of DeVelice et al. (1991) in eastern Montana apparently includes stands with abundant *Stipa comata*.|Coupland's (1961) *Bouteloua - Agropyron* Faciation apparently represents this association near its northern limit.|Johnston's (1987) *Elytrigia smithii* / *Bouteloua gracilis* association apparently includes some stands of this association.|Johnston's (1987) *Elytrigia smithii* / *Carex filifolia* association apparently includes some stands of this association.

ECOREGIONAL DISTRIBUTION: 331D:CP|331F:CC|331G:CC|331H:C?

STATE DISTRIBUTION: Stands of this association have been described from the southeastern corner of Alberta and the southwestern corner of Saskatchewan (Coupland 1961), eastern Montana (Hansen and Hoffman 1988, DeVelice et al. 1991), western North Dakota (Hanson and Whitman 1938, Quinnild and Cosby 1958, Hansen et al. 1984, Hansen and Hoffman 1988), northwestern Nebraska (Steinauer and Rolfsmeier 1997), and eastern Wyoming (Costello 1944, Thilenius et al. 1995).

NORTHERN GREAT PLAINS NATIONAL FOREST DISTRIBUTION: This association occurs on the Sioux and Grand River Districts of the Custer National Forest (Hansen and Hoffman 1988) and on the Thunder Basin National Grassland (Thilenius et al. 1995). It probably also occurs on the Little Missouri National Grassland, the Buffalo Gap National Grassland, and the Oglala National Grassland.

ENVIRONMENTAL DESCRIPTION: Stands of this association occur on nearly level uplands, gentle to moderately steep slopes, and floodplains. Surface layers of soils are usually clay loams, although stands of this type may also be found on loams, silt loams, silty clays and clays. In Alberta and Saskatchewan (Coupland 1961), this association grows on solonetzic soils (with an

elluvial horizon above a dense clay horizon high in sodium salts) developed thin glacial till over Cretaceous shale.

VEGETATION DESCRIPTION: Graminoids contribute most of the cover in the vegetation; while a variety of forbs and a smaller number of shrubs may be present, they contribute little cover relative to the graminoids. *Pascopyrum smithii* or *Elymus lanceolatus* or both (the two species are similar morphologically and ecologically) and *Bouteloua gracilis* usually contribute the most cover, but *B. gracilis* may contribute little cover and it may be absent locally. *Carex filifolia* and other low sedges (*C. eleocharis* [syn. *C. stenophylla*], *C. pensylvanica*) often are secondary species, but in many stands the sedges contribute little cover and they may be absent locally. *Stipa comata* usually is present as a secondary species, but it often co-dominates on sandy loam soils; this species never contributes more cover than do *P. smithii* or *E. lanceolatus*. In Alberta and Saskatchewan, *Stipa spartaea* var. *curtiseta* may be as common in the vegetation as is *S. comata*. *Koeleria macrantha* is present in most stands and may contribute substantial cover. The forbs most likely to be found in this association are *Phlox hoodii, Sphaeralcea coccinea, Polygonum ramosissimum, Plantago patagonica, Opuntia polyacantha, Artemisia frigida, Antennaria microphylla,* and *Hedeoma hispida*. In southeastern Montana, western North Dakota, and northeastern Wyoming, stands of this association often contain *Artemisia tridentata* ssp. *wyomingensis*. Exotic brome grasses, especially *Bromus commutatus* and *B. tectorum*, are present in many stands of this association and they commonly contribute substantial cover.

NATURAL DISTURBANCES:

CONSERVATION RANK: G4

RANK JUSTIFICATION: The G4 rank is based on the broad geographic range of this type, and its status as a common vegetation type within that geographic range.

MANAGEMENT COMMENTS: Heavy grazing causes a decrease in the amount of *Pascopyrum smithii* and allows *Bouteloua gracilis, Festuca idahoensis,* and other unpalatable or grazing-resistant species to increase, and prolonged heavy grazing apparently can convert this association to vegetation dominated by *B. gracilis* (Costello 1944, Hansen and Hoffman 1988)

DATABASE CODE: CEGL001579

REFERENCES:

Costello, D.F. 1944. Important species of the major forage types in Colorado and Wyoming. Ecological monographs 14(1): 107-134.

Coupland, R.T. 1961. A reconsideration of grassland classification in the northern Great Plains of North America. Ecology 49:135-167.

DeVelice, R.L., J. Lichthardt, and P.S. Bourgeron. 1991. A preliminary classification of the plant communities of northeastern Montana. Prepared for the Montana Natural Heritage Program, Helena MT. 144 pp.

Ellison, L. and E.J. Woolfolk. 1937. Effects of drought on vegetation near Miles City, Montana. Ecology 18(3): 329-336.

Hansen, P.L., G.R. Hoffman, and A. J.Bjugstad. 1984. The vegetation of Theodore Roosevelt National Park, North Dakota: a habitat type classification. USDA Forest Service General Technical Report RM-113. 35 pp.

Hansen, P.L. and G.R. Hoffman. 1988. The vegetation of the Grand River/Cedar River, Sioux, and Ashland Districts of the Custer National Forest: a habitat type classification. USDA Forest Service General Technical Report RM-157, Rocky Mountain Forest and Range Experiment Station, Fort Collins CO. 68 pp.

Hanson, H.C. and W. Whitman. 1938. Characteristics of major grassland types in western North Dakota. Ecological monographs 8(1): 57-114.

Johnston, B.C. 1987. Plant associations of Region Two. Edition 4. USDA Forest Service, Rocky Mountain Region. R2-ECOL-87-2. 429 pp.

Quinnild, C.L. and H.E. Cosby. 1958. Relicts of climax vegetation on two mesas in western North Dakota. Ecology 39:29-32.

Steinauer, G. and S. Rolfsmeier. 1997. Terrestrial natural communities of Nebraska. Nebraska Game and Parks Commission, Lincoln NE. 117 pp.

Thilenius, John F., Gary R. Brown, and Alvin L. Medina. 1995. Vegetation on semi-arid rangelands, Cheyenne River Basin, Wyoming. USDA Forest Service General Technical Report RM-GTR-263. Fort Collins, CO. 60 pp.

Weaver, J.E. and F.W. Albertson. 1956. Grasslands of the Great Plains: their nature and use. Johnsen Publishing Company, Lincoln NE. 395 pp.

CLASS: HERBACEOUS VEGETATION

FORMATION: MEDIUM-TALL SOD TEMPERATE OR SUBPOLAR GRASSLAND (V.A.5.N.C)
ALLIANCE: PASCOPYRUM SMITHII HERBACEOUS ALLIANCE

PASCOPYRUM SMITHII - NASSELLA VIRIDULA HERBACEOUS VEGETATION

COMMON NAME: Western Wheatgrass - Green Needlegrass Herbaceous Vegetation

COLLOQUIAL NAME: Western Wheatgrass - Green Needlegrass Mixedgrass Prairie

COMMUNITY SUMMARY: *Pascopyrum smithii - Nassella viridula* Herbaceous Vegetation is common across much of the northern Great Plains on relatively mesic sites such as narrow valleys, stream terraces, and gentle upland slopes. The soils are usually fine-textured with well-developed profiles. The vegetation is dominated by midgrasses with moderately dense to dense vegetation cover. *Pascopyrum smithii* usually is the dominant species, and *Nassella viridula* contributes at least 5% cover. *Elymus lanceolatus*, another rhizomatous wheatgrass, also is present in many stands and may replace *Pascopyrum smithii* as the dominant species.

CLASSIFICATION COMMENTS: This association includes stands growing on mesic sites, and containing substantial cover of plants characteristic of such sites, including *Nassella viridula*, *Poa juncifolia*, *Poa nevadensis*, *Poa pratensis*, and *Achillea millefolium*. The amount of these species that is diagnostic of this association is unknown (pending further analysis of stand data), but they contribute at least 5% of the herbaceous canopy cover. Some of these species (especially *N. vrididula*) may be present in upland vegetation (such as the *Pascopyrum smithii - Bouteloua gracilis - Carex filifolia* association [CEGL001579]), but they contribute only trace amounts to the vegetation.

SIMILAR COMMUNITIES: The *Artemisia cana* ssp. *cana* / *Pascopyrum smithii* shrub herbaceous association has a denser shrub layer and herbaceous layer similar in composition to the vegetation of this association. In the *Pascopyrum smithii - Bouteloua gracilis - Carex filifolia* association, which grows on upland sites, *Nassella viridula* may be present but contributes only a trace of cover.

OTHER NAMES: Wheatgrass basin prairie (Steinauer and Rolfsmeier 1997) |*Elytrigia smithii* / *Stipa viridula* plant association (Johnston 1987) |*Agropyron smithii* / *Carex filifolia* habitat type (Hansen et al. 1984)|*Agropyron smithii* / *Carex filifolia* habitat type (Hansen and Hoffman 1988) |*Pascopyrum smithii* / *Stipa viridula* plant community (DeVelice et al. 1991)|Pascopyrum *smithii* (*Elymus lanceolatus*) - *Nassella viridula* plant association (Vanderhorst et al.1998) |*Stipa viridula* - *Agropyron smithii* / *Bouteloua gracilis* community type (Prodgers 1978)||Bottomland grassland (Smith, no date).|*Agropyron smithii* - *Stipa viridula* habitat type (Hirsch 1985)|Mixed Prairie Association, *Agropyron* - *Koeleria* Faciation (Coupland 1961)|Western wheatgrass (*Elymus smithii*) community (Jones and Walford 1995).

RELATION TO OTHER NAMES: ?|=|+|+|=|=|-|+|+|?|+

COMMENTS ON OTHER NAMES: Steinauer and Rolfsmeier (1997) note that their wheatgrass basin prairie type is poorly known and that it may be the same as this association.|Johnston's (1987) type apparently is synonymous with this association.|Hansen's et al. (1984) habitat type in western North Dakota apparently supports stands of this association (Table A-2, stands 5 and 62).|Hansen's and Hoffman's (1988) habitat type in southeastern Montana and northwestern North Dakota apparently support stands of this association (Table A-5, stands 5, 65, 138).|DeVelice's et al. (1991) community from northeastern Montana apparently is synonymous with this association.|Vanderhorst et al. (1998) have described this association from two stands in southeastern Montana, both of which they consider to be atypical of this association both in environment (upland slopes rather than draws) and vegetation (sparse cover, with no *Koeleria macrantha*, *Bouteloua gracilis*, *Carex filifolia*, but with *Eriogonum pauciflorum*).|Prodgers (1978) describes this association from northeastern Montana.|Smith's (no date) bottomland grassland in northeastern Wyoming apparently includes this association.|Hirsch's (1985) habitat type supports stands of this association in southwestern North Dakota.|Coupland (1961) may have described a stand of this association in southwestern Saskatchewan with an unusually large amount of *Koeleria macrantha*.|The *Elymus smithii* community of Jones and Walford (1995) in northeastern Wyoming includes stands of this association.

ECOREGIONAL DISTRIBUTION: 331C:CC|331D:CC|331F:CC|331G:CC|331H:CC|331I:CC

STATE DISTRIBUTION: This association is known from Montana (Hansen et al. 1988, DeVelice et al. 1991, Vanderhorst et al. 1998), North Dakota (Hansen and Hoffman 1988), South Dakota (Hansen et al. 1988, Johnston 1987), Wyoming (Smith, no date), and eastern Colorado (S. Kettler, Colorado Natural Heritage Program, pers. comm., 12/98). It may also occur in Saskatchewan (Coupland 1961) and Nebraska (Steinauer and Rolfsmeier 1997).

NORTHERN GREAT PLAINS NATIONAL FOREST DISTRIBUTION: Johnston (1987) lists this association from the Buffalo Gap National Grassland (but gives no source) and the Ft. Pierre National Grassland. It also occurs on the Sioux and Grand River Districts of the Custer National Forest (Hansen et al. 1988) and on the Thunder Basin National Grassland (Jones 1997(a) - (e)).

ENVIRONMENTAL DESCRIPTION: This association generally occupies positions on the landscape that receive supplemental moisture, such as draws and terraces along streams and gentle upland slopes. Soils are fine-textured (clays, silty clays, clay loams, or rarely loams) and well-drained.

VEGETATION DESCRIPTION: Stands of this association are dominated by grasses with a small amount of forbs and, often, scattered shrubs. *Pascopyrum smithii* usually is the dominant grass, although *Elymus lanceolatus* (another rhizomatous wheatgrass similar morphologically and ecologically to *P. smithii*) is the dominant species in some stands. *Nassella viridula* contributes substantial cover and may co-dominate; at least 5% canopy cover of this species may be diagnostic for this association. Other common grasses are *Stipa comata*, *Koeleria macrantha*, *Poa*

spp. (*P. juncifolia, P. pratensis*), *Sporobolus cryptandrus*, and, on sandier soils, *Calamovilfa longifolia*. Shorter graminoids are common, including *Bouteloua gracilis, Carex eleocharis, C. filifolia*, and *C. inops* ssp. *heliophila*, and *C. pensylvanica*. These species are present in many stands, but they usually contribute little cover. The wheatgrass basin association of Nebraska (Steinauer and Rolfsmeier 1997), which may belong to this association, also contains *Schizachyrium scoparium*. Cheatgrasses (*Bromus commutatus, B. japonicus, B. tectorum*) are present in many stands and contribute substantial cover in some. The forbs *Aster falcatus, Astragalus* spp., *Achillea millefolium, Sphaeralcea coccinnea, Artemisia ludoviciana, Lepidium densiflorum*, and *Vicia americana* are also typical of this community. *Artemisia cana* ssp. *cana* or *A. tridentata* ssp. *wyomingensis* may be present, often as scattered shrubs contributing little cover. Stands with denser shrubs are transitional to shrub-herbaceous vegetation.

NATURAL DISTURBANCES:

CONSERVATION RANK: G4

RANK JUSTIFICATION: The G4 rank is based on the broad geographic distribution and the relatively broad environmental requirements of this association. The prevalence of cheatgrass in many stands, though, may necessitate a review of this rank.

MANAGEMENT COMMENTS: Heavy livestock grazing reduces the cover of *Pascopyrum smithii* and allows unpalatable or grazing-resistant species such as *Bouteloua gracilis, Festuca octoflora*, and cheatgrass (*Bromus* spp.) to increase (Hansen and Hoffman 1988. Observations by Vanderhorst et al. (1998) suggest that grazing causes *N. viridula*, a species highly palatable to all classes of livestock and to wildlife, especially in the spring (Weaver and Albertson 1956, USDA Soil Conservation Service 1988), to decrease as well. S. Kettler, Colorado Natural Heritage Program (pers. comm., 12/98) reports an instance in eastern Colorado where implementation of a short-duration grazing regime resulted in this vegetation expanding from swales to cover much of the upland with clay soils.

DATABASE CODE: CEGL001583

REFERENCES:

Coupland, R.T. 1961. A reconsideration of grassland classification in the northern Great Plains of North America. Ecology 49:135-167.

DeVelice, R.L., J. Lichthardt, and P.S. Bourgeron. 1991. A preliminary classification of the plant communities of northeastern Montana. Prepared for the Montana Natural Heritage Program, Helena MT. 144 pp.

Hansen, P.L., G.R. Hoffman, and A. J.Bjugstad. 1984. The vegetation of Theodore Roosevelt National Park, North Dakota: a habitat type classification. USDA Forest Service General Technical Report RM-113. 35 pp.

Hansen, P.L. and G.R. Hoffman. 1988. The vegetation of the Grand River/Cedar River, Sioux, and Ashland Districts of the Custer National Forest: a habitat type classification. USDA Forest Service General Technical Report RM-157, Rocky Mountain Forest and Range Experiment Station, Fort Collins CO. 68 pp.

Hirsch, K.J. 1985. Habitat type classification of grasslands and shrublands of southwestern North Dakota. Ph.D. Thesis, North Dakota State University, Fargo ND.

Johnston, B.C. 1987. Plant associations of Region Two. Edition 4. USDA Forest Service, Rocky Mountain Region. R2-ECOL-87-2. 429 pp.

Jones, G.P. and G.M. Walford. 1995. Major riparian vegetation types of eastern Wyoming. Unpublished report submitted to the Wyoming Department of Environmental Quality, Water Quality Division by the Wyoming Natural Diversity Database, Laramie WY. 245 pp.

Jones, G.P. 1997a. Ecological evaluation of the potential Meadow Creek Research Natural Area within the Thunder Basin National Grassland, Converse County, Wyoming. Unpublished report prepared for Nebraska National Forest, USDA Forest Service by the Wyoming Natural Diversity Database, Laramie WY. 37 pp.

Jones, G.P. 1997b. Ecological evaluation of the potential Big Draw Research Natural Area within the Thunder Basin National Grassland, Campbell and Crook Counties, Wyoming. Unpublished report prepared for Nebraska National Forest, USDA Forest Service by the Wyoming Natural Diversity Database, Laramie WY. 23 pp.

Jones, G.P. 1997c. Ecological evaluation of the potential Rochelle Hills Research Natural Area within the Thunder Basin National Grassland, Campbell County, Wyoming. Unpublished report prepared for Nebraska National Forest, USDA Forest Service by the Wyoming Natural Diversity Database, Laramie WY. 38 pp.

Jones, G.P. 1997d. Ecological evaluation of the potential Sixmile Basin Research Natural Area within the Thunder Basin National Grassland, Weston County, Wyoming. Unpublished report prepared for Nebraska National Forest, USDA Forest Service by the Wyoming Natural Diversity Database, Laramie WY. 28 pp.

Jones, G.P. 1997e. Ecological evaluation of the potential Coal Bank Draw Research Natural Within the Thunder Basin National Grassland, Converse County, Wyoming. Unpublished report prepared for Nebraska National Forest, USDA Forest Service by the Wyoming Natural Diversity Database, Laramie WY. 34 pp.

Jones, G.P. 1997x. Ecological evaluation of the potential XX research natural area within the Thunder Basin National Grassland, XX County, Wyoming. Unpublished report prepared for Nebraska National Forest, USDA Forest Service by the Wyoming Natural Diversity Database, Laramie WY. Xx pp.

Prodgers, R. 1978. Circle West vegetation baseline study: final report. Circle West technical report no. 1. Energy Division, Montana Department of Natural Resources and Conservation. Helena MT. 115 pp.

Smith, Jack. No date. Comprehensive vegetation data base for surface mining in Wyoming. Wyoming Department of Environmental Quality, Land Quality Division, Cheyenne WY. 27 pp.

Steinauer, G. and S. Rolfsmeier. 1997. Terrestrial natural communities of Nebraska. Nebraska Game and Parks Commission, Lincoln NE. 117 pp.

USDA Soil Conservation Service. 1988. Range site technical guides for Wyoming.

Vanderhorst, Jim, Stephen V. Cooper, and Bonnie Heidel. 1998. Botanical and vegetation survey of Carter County, Montana. Unpublished report prepared for the Bureau of Land Management. Montana Natural Heritage Program, Helena. 116 pp. + app.

Weaver, J.E. and F.W. Albertson. 1956. Grasslands of the Great Plains: their nature and use. Johnsen Publishing Company, Lincoln NE. 395 pp.

CLASS: HERBACEOUS VEGETATION

FORMATION: MEDIUM-TALL SOD TEMPERATE OR SUBPOLAR GRASSLAND (V.A.5.N.C)
ALLIANCE: PASCOPYRUM SMITHII HERBACEOUS ALLIANCE

PASCOPYRUM SMITHII - STIPA COMATA CENTRAL MIXEDGRASS HERBACEOUS VEGETATION

COMMON NAME: Western Wheatgrass - Needle-And-Thread Grass Central Mixedgrass Herbaceous Vegetation

COLLOQUIAL NAME: Wheatgrass - Needle-And-Thread Mixedgrass Prairie

COMMUNITY SUMMARY: This mixedgrass prairie type is found throughout the north-central Great Plains on many different topographic and soil types. It can be on upland slopes, ridgetops, plateaus, stream terraces, and rolling sandhills. The soils are fine to medium textured (clay to sandy loam) and moderately deep to deep. They are derived from a variety of parent material across this community's range. These materials include eolian sand, sandstone, shale, siltstone, loess, or alluvium. The dominant vegetation in this community is midgrasses. The vegetation may be moderately open to dense. The most abundant species are *Pascopyrum smithii* and *Stipa comata*. Other graminoids that may be present to abundant are *Aristida purpurea, Aristida basiramea, Bouteloua gracilis, Calamovilfa longifolia* (on sandy soils), *Carex eleocharis, Carex filifolia, Koeleria macrantha, Schizachyrium scoparium,* and *Stipa spartea*. Common forbs include *Amorpha canescens, Artemisa campestris, Helianthus petiolaris,* and *Tragopogon dubius.* Shrubs are rare in this community. Scattered *Artemisia frigida, Rosa arkansana,* and occasional *Symphoricarpos occidentalis* may be present.

CLASSIFICATION COMMENTS: This type may not occur in Nebraska (Steinauer and Rolfsmeier 1997). This type is somewhat conceptually vague. It potentially includes stands that have more moderately coarse-textured soils and somewhat drier than other *Pascopyrum smithii* types. A major review of published material is needed in central North and South Dakota to clarify this type. In particular it would be worth examining whether or not more western Great Plains species are absent from the central mixedgrass region.

SIMILAR COMMUNITIES: CEGL001583 *Pascopyrum smithii – Nasella viridula* Herbaceous Vegetation

OTHER NAMES:

RELATION TO OTHER NAMES:

COMMENTS ON OTHER NAMES:

ECOREGIONAL DISTRIBUTION: 251Aa Lake Agassiz Plain:C, 332A Northeastern Great Plains Section:C, 332B Western Glaciated Plains Section:C, 332D North-Central Great Plains Section:C, 331E Northern Glaciated Plains Section:P, 331F Northwestern Great Plains Section:C

STATE DISTRIBUTION: MB, ND, NE, SD, SK

NORTHERN GREAT PLAINS NATIONAL FOREST DISTRIBUTION:

ENVIRONMENTAL DESCRIPTION: This community occurs on many different topographic and soil types. It can occur on upland slopes, ridgetops, plateaus, stream terraces, and rolling sandhills (Steinauer 1989, USFS 1992). The soils are fine to medium textured (clay to sandy loam) and moderately deep to deep. They are derived from a variety of materials across this community's range. These include eolian sand, sandstone, shale, siltstone, loess, or alluvium.

VEGETATION DESCRIPTION: Midgrasses dominate this community. The vegetation may be moderately open to dense. The most abundant species are *Pascopyrum smithii* and *Stipa comata*.

Other graminoids that may be present to abundant are *Aristida purpurea, Aristida basiramea, Bouteloua gracilis, Calamovilfa longifolia* (on sandy soils), *Carex eleocharis, Carex filifolia, Koeleria macrantha, Schizachyrium scoparium,* and *Stipa spartea*. Common forbs include *Amorpha canescens, Artemisa campestris, Helianthus petiolaris,* and *Tragopogon dubius.* Shrubs are rare in this community. Scattered *Artemisia frigida, Rosa arkansana,* and occasional *Symphoricarpos occidentalis* may be present.

NATURAL DISTURBANCES:

CONSERVATION RANK: G4

RANK JUSTIFICATION:

MANAGEMENT COMMENTS:

DATABASE CODE: CEGL002034

REFERENCES:

Steinauer, G. and S. Rolfsmeier. 1997. Terrestrial natural communities of Nebraska. Draft - October 28, 1997. Nebraska Game and Parks Commission, Lincoln, NE. 117 p.

Steinauer, G. 1989. Characterization of the natural communities of Nebraska. Appendix D, p. 103-114 in: M. Clausen, M. Fritz, and G. Steinauer. The Nebraska Natural Heritage Program, two year progresss report. Unpubl. Doc. Nebr. Game and Parks Comm., Nat. Heritage Prog. Lincoln, Nebr.

United States Forest Service. 1992. Draft habitat types of the Little Missouri National Grasslands. Medora and McKenzie Ranger Districts, Custer National Forest. Dickinson, ND.

CLASS: HERBACEOUS VEGETATION

FORMATION: MEDIUM-TALL SOD TEMPERATE OR SUBPOLAR GRASSLAND (V.A.5.N.C)
ALLIANCE: STIPA COMATA - BOUTELOUA GRACILIS HERBACEOUS ALLIANCE

STIPA COMATA - BOUTELOUA GRACILIS - CAREX FILIFOLIA HERBACEOUS VEGETATION

COMMON NAME: Needle-And-Thread Grass - Blue Grama - Threadleaf Sedge Herbaceous Vegetation

COLLOQUIAL NAME: Needle-And-Thread - Blue Grama Mixedgrass Prairie

COMMUNITY SUMMARY: This mixedgrass prairie type is one of the the most common plant associations in the Northern Great Plains. The *S. comata - Bouteloua gracilis - Carex filifolia* community is more associated with uplands, though it may also occur lower in the landscape,

such as coulee and draw bottoms, if soils are sufficiently coarse, usually sandstone derived. Even though it is a major association there are extensive areas where exclusively shale and mudstone constitute the parent materials and from which heavy soils are derived; these landscapes do not support this plant association. Elevations of the type typically range between 2,000 and 5,500 ft; average annual precipitation associated with these elevation parameters ranges from slightly less than 10 to slightly more than 20 inches. *Stipa comata* is the tallest of the dominant species, sending seed heads to a maximum height of approximately 1 m. The rhizomatous graminoids, *Bouteloua gracilis* and *Carex filifolia*, the other two dominant/co-dominant species, do not usually exceed 0.5 meters. *Calamovilfa longifolia* is often found with high cover values on sandier soils and *Koeleria macrantha* cover increases on degraded sites. There are regionalized expressions of variability with *C. inops* var. *heliophila* surpassing *C. filifolia* in Colorado and *Calamagrostis montanensis* being at least as important as the diagnostic species in north-central Montana. *Pascopyrum smithii* is consistently present and reaches the same height as *S. comata*. For woody species, subshrub forms (*Artemisia frigida, Gutierrezia sarothrae, Rosa arkansana*) have the highest cover and constancy but their total cover does not sum to more than 5%, except on overgrazed sites. Regardless of the geographic region of this broadly distributed type, cover values for forbs are low (exception being *Selaginella densa*, see MANAGEMENT COMMENTS), though geographic setting does influence forb composition to some degree. *Sphaeralcea coccinea, Phlox hoodii, Heterotheca villosa, Gaura coccinia*, and *Liatris punctata*, at least in the northern distribution of this type, have high constancy values. The constancy of *Lygodesmia juncea, Opuntia polyacantha, Artemisia dracunculus* and *Ratibida columnifera* seems to increase to the eastern and southern portions of the type's distribution. Total vegetative cover is moderate to moderately dense.

CLASSIFICATION COMMENTS: The floristically and ecologically similar association, *Stipa comata - Bouteloua gracilis* Herbaceous Vegetation (CEGL001699), is generally most prominent south of the distribution of this association (from approximately northern Colorado southward and to the east). *Carex filifolia* is lacking or highly reduced in importance and the type tends to occur on steeper slopes. Weave and Albertson (1956) also remark on the fact that low sedges are present as far south as Texas but, are important only north of Colorado. However, a phase of the *S. comata – B. gracilis* type of Mueggler and Stewart (1980) in western Montana is apparently quite similar to communities of the southern and southeastern portions or the Northern Great Plains (though it lacks *C. filifolia*). So that the distinction between *S. comata – B. gracilis* and *S. comata – B. gracilis – Carex filifolia* may not rest on geographic affinities alone. There is a welter of named community types, mostly seral representations of grazing or fire impacts, that vary by having one or another of the defining species (or even other graminoids e.g. *Carex inops* ssp. *heliophila*) dominant. This assemblage of types is also defined by having relatively low cover of both *Pascopyrum smithii* (syn. *Agropyron smithii*) and *Elymus lanceolatus* (syn. *Agropyron dasystachyum*). To accommodate these permutations within the concept of the type (as lesser-ranked occurrences) or to recognize them as independent vegetation types recognized by existing vegetation composition is one question. Another is, what cover value or degree of dominance of *P. smithii* or *E. lanceolatus* will serve to establish the distinction between *A. smithii – Stipa comata – Carex filifolia* (and allied *A. smithii* "dominated" communities) from the community under consideration.

SIMILAR COMMUNITIES: This community (denoted by the species order of the name) is the most cited of the six permutations that can be derived from the three diagnostic species however, at least three others can be cited (Prodgers 1978, Culwell and Scow 1982, Jensen et al. 1992). The names of these permutations generally reflect the changing order of most to least important species (based on cover). The floristically and ecologically similar association, *Stipa comata - Bouteloua gracilis* Herbaceous Vegetation, is generally found south of the association under consideration (from approximately east-central Colorado southward and to the east), lacks *Carex*

filifolia, and tends to occur on steeper slopes. A permutation of this community with southern affinities, *B. gracilis – S. comata* (Wright and Wrght 1948) was in fact defined for the prairies of south central Montana and has appreciable amounts of *C. filifolia*. Mueggler and Stewart (1980) defined a *S. comata – B. gracilis* habitat type for western Montana, part of which, the *Agropyron smithii* phase is virtually identical to the modal concept of the *S. comata – B. gracilis – C. filifolia* association (note they could have easily justified naming the phase *C. filifolia*). Coupland (1961) described a *Stipa – Bouteloua* faciation for the Canadian prairies and noted that *Carex* (infering mostly *C. filifolia*) should be added to the name. Coupland's *Stipa – Bouteloua* faciation includes the type under consideration but also includes a broader range of the moisture gradient as evidenced by the abundance of *Stipa spartea* (syn. *S. curtiseta*) and *Agropyron dasystachyum* (syn. *Elymus lanceolatus*).

: *Stipa comata - Bouteloua gracilis - Carex filifolia* Herbaceous Vegetation could be considered, along with *Pascopyrum smithii – B. gracilis – C. filifolia*, as the the most common plant associations in the Northern Great Plains Steppe Ecoregion (Martin et al. 1998, equivalent to Bailey's Great Plains-Palouse Dry Steppe Province except for the northwestern disjunct portion of Bailey's Province). These two associations, cited by many authors as the climatic climax (long-term stable) communities for this region, are manifested by matrix or large patch occurrences frequently found dominating whole landscapes. The *S. comata* defined community is more associated with uplands and the *P. smithii* defined type characterizes sites with higher moisture status, generally occurring at lower positions in the landscape. It is found most often and in the most extensive expanses on flat to rolling topography with deep (40-100 cm) sandy loam to loam soils. *S. comata – B. gracilis – C. filifolia* may also occur lower in the landscape, such as coulee and draw bottoms, if soils are sufficiently coarse, usually sandstone derived.

OTHER NAMES: *Bouteloua gracilis – Stipa comata* "type" (Wright and Wright 1948)| *Bouteloua gracilis – Stipa comata –Koeleria cristata* (syn. *K. macrantha*) "type" (Wright and Wright 1948)| *Stipa comata / Bouteloua gracilis – Stipa comata* community type (Prodgers 1978)| *Bouteloua gracilis – Carex filifolia / Stipa comata* community type (Prodgers 1978)|*Stipa comata – Bouteloua gracilis* habitat type, *Agropyron smithii* (syn. *Pascopyrum smithii*) phase (Mueggler and Stewart 1980)| *Bouteloua gracilis – Carex filifolia* sodgrass steppe (Thilenius et al. 1995)| *Stipa comata – Carex filifolia – Bouteloua gracilis* Seral Community Type (Jensen et al. 1992)| *Carex filifolia – Stipa comata –Bouteloua gracilis* Seral Community Type (Jensen et al. 1992)| *Stipa comata – Carex filifolia* Potential Natural Community Type (Jensen et al. 1992)| *Stipa comata – Carex filifolia* habitat type (Hansen and Hoffman 1988)| *Bouteloua gracilis – Stipa comata – Carex filifolia* type (Hanson and Whitman 1938*)*| *Stipa comata – Carex filifolia – Koeleria cristata* (syn. *K. macrantha*) "type" (Culwell and Scow 1982)

RELATION TO OTHER NAMES: -|-|=|-|=|-|+|+|=|+|=|-

COMMENTS ON OTHER NAMES:

ECOREGIONAL DISTRIBUTION: 331D:CC| 331E:CC| 331F:CC| 333G:CC| 331H|

STATE DISTRIBUTION: This association is confirmed for Alberta, Manitoba, Montana, Nebraska, North Dakota, South Dakota, Saskatchewan, and Wyoming. It may occur in northeastern Colorado.

NORTHERN GREAT PLAINS NATIONAL FOREST DISTRIBUTION: Thunder Basin National Grassland (Jones 1997a, b, c); Little Missouri National Grassland; Grand River/Cedar River, Sioux, and Ashland Districts of the Custer National Forest; (this type also occurs on the lowermost fringes of National Forest lands associated with intermontane valleys of western Montana)

ENVIRONMENTAL DESCRIPTION: *Stipa comata - Bouteloua gracilis - Carex filifolia* Herbaceous Vegetation could be considered, along with *Pascopyrum smithii – B. gracilis – C. filifolia*, as the the most common plant associations in the Northern Great Plains Steppe Ecoregion (Martin et al. 1998, equivalent to Bailey's Great Plains-Palouse Dry Steppe Province except for the northwestern disjunct portion of Bailey's Province). These two associations, cited by many authors as the climatic climax (long-term stable) communities for this region, are manifested by matrix or large patch occurrences frequently found dominating whole landscapes. The *S. comata* defined community is more associated with uplands and the *P. smithii* defined type characterizes sites with higher moisture status, generally occurring at lower positions in the landscape. It is found most often and in the most extensive expanses on flat to rolling topography with deep (40- 100 cm) sandy loam to loam soils. *S. comata – B. gracilis – C. filifolia* may also occur lower in the landscape, such as coulee and draw bottoms, if soils are sufficiently coarse, usually sandstone derived. Elevations of the type typically range between 2,000 and 5,500 ft; average annual precipitation associated with these elevation parameters ranges from slightly less than 10 to slightly more than 20 inches.

VEGETATION DESCRIPTION: *Stipa comata* is the tallest of the dominant species, sending seed heads to a maximum height of approximately 1 m. The rhizomatous graminoids, *Bouteloua gracilis* and *Carex filifolia*, the other two dominant/co-dominant species, do not usually exceed 0.5 meters. *Calamovilfa longifolia* is often found with high cover values on sandier soils and *Koeleria macrantha* cover increases on degraded sites. There are regionalized expressions of variability with *C. inops* var. *heliophila* surpassing *C. filifolia* in Colorado and *Calamagrostis montanensis* being at least as important as the diagnostic species in north-central Montana. *Pascopyrum smithii* is consistently present and reaches the same height as *S. comata*. For woody species, subshrub forms (*Artemisia frigida, Gutierrezia sarothrae, Rosa arkansana*) have the highest cover and constancy but their total cover does exceed more than 5%, except on overgrazed sites. Regardless of the geographic region of this broadly distributed type, cover values for forbs are low (exception being *Selaginella densa*, see MANAGEMENT COMMENTS), though geographic setting does influence forb composition to some degree. *Sphaeralcea coccinea, Phlox hoodii, Heterotheca villosa, Gaura coccinia*, and *Liatris punctata*, at least in the northern distribution of this type, have high constancy values; the constancy of *Lygodesmia juncea, Opuntia polyacantha, Artemisia dracunculus* and *Ratibida columnifera* seems to increase to the eastern and southern portions of the type's distribution. Total vegetative cover is moderate to dense.

NATURAL DISTURBANCES: Vast (singly and in the aggregate) prairie dog (*Cynomys ludovicianus, C. leucurus*) "towns" were once developed on the favorable substrates and exploited the vegetation of this type. Prairie dog populations have undergone a precipitous decline since settlement, so much of this type could be in various states of secondary succession, returning from a somewhat denuded state and altered composition created by the prairie dogs (and attendant bison that found nutritious forage here). Fire, both aboriginal and lightening-caused, was a regular part of this landscape. Fire-return intervals have been considerably lengthened since settlement by European-Americans.

CONSERVATION RANK: G5

RANK JUSTIFICATION: This is an exceedingly common type, manifesting any number of permutations, some of which are related to disturbance and some of which appear to be related to the expected geographic distinctions in a such a broadly distributed type. The only reason to consider it a G4 is that it has received, and continues to receive, significant grazing pressure, which combined with the surge in alien weed populations, pose a significant threat to its quality.

MANAGEMENT COMMENTS: Over portions of this type's range, especially in north-central Montana and into Alberta and Saskatchewan, *Selaginella densa* has established very high ground cover (in excess of 90% in places). Ostensibly this sward of *S. densa* constitutes competition for the native grasses, decreasing their production. What exactly leads to this condition is currently a moot point but "chiseling" and grazing of domestic stock (to break up the cover with trampling [Coupland 1961]) are said to ameliorate the condition. *Bromus japonicus* and *B. tectorum* (winter annuals) are the major weedy species over the much of the northern and eastern portions. Their populations can be remarkably increased by summer and autumn fires, especially where grazing has been intensive. *Bromus inermis* (smooth brome) and *Melilotus officinalis* (yellow sweet clover), though not considered weeds, have been seeded as roadside stabilizers and to create dense nesting cover. They find these sites very conducive and they aggressively increase, out-competing native vegetation and leading to biodiversity impoverishment of the whole system.

DATABASE CODE: CEGL002037

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Thilenius, J. F., G. R. Brown and A. L Medina. 1995. Vegetation on semi-arid rangelands, Cheyenne River Basin, Wyoming. USDA Forest Service General Technical Report RM-GTR-263. Rocky Mountain Forest and Range Experiment Station, Fort Collins, CO. 60 pp.

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CLASS: HERBACEOUS VEGETATION

FORMATION: MEDIUM-TALL SOD TEMPERATE OR SUBPOLAR GRASSLAND (V.A.5.N.C)
ALLIANCE: PSEUDOROEGNERIA SPICATA - BOUTELOUA GRACILIS HERBACEOUS ALLIANCE

PSEUDOROEGNERIA SPICATA - BOUTELOUA GRACILIS HERBACEOUS VEGETATION

COMMON NAME: Bluebunch Wheatgrass-Blue Grama

COLLOQUIAL NAME: Bluebunch Wheatgrass - Blue Grama Mixedgrass Prairie

COMMUNITY SUMMARY: This bluebunch wheatgrass grassland is found in the western Great Plains and at low elevations in the Front Range of the Rocky Mountains. In Montana stands are found on toeslopes of the foothills and steeper slopes of valley bottoms. Soils are typically moderately deep (40 – 100 cm), with a variety of parent materials, and neutral in pH. Surface rock varies from 1 to 46%. In Montana, the vegetation is open (40-60% cover) and dominated by graminoids. *Pseudoroegneria spicata* shares dominance with *Stipa comata*. *Bouteloua gracilis* is always present, but in varying amounts depending on grazing history (increasing with heavy grazing). Associated graminoids include *Carex stenophylla*, *Koeleria macrantha*, and *Poa sandbergii*. The most constant forbs include *Artemisia frigida* (sometimes classified as a shrub), *Phlox hoodii* and *Sphaeralcea coccinea*. Slightly more productive sites contain *Calamagrostis montanensis*, *Carex filifolia, Chrysopsis villosa*, and *Liatris punctata*. Shrub cover is less than 10%. Low growing shrubs include *Gutierrezia sarothrae* and *Opuntia polyacantha,* and taller shrubs may include *Chrysothamnus nauseosus.*

CLASSIFICATION COMMENTS: This description is based almost entirely on Mueggler and Stewart's (1980) publication. Information in Colorado needs to be incorporated. Ecoregion distribution in Colorado needs to be determined. This alliance needs to be combined with the "Pseudoroegneria spicata Herbaceous Alliance." Thilenius et al. (1995) report a *Bouteloua gracilis-Agropyron spicatum* type in their preliminary list for the Cheyenne River Basin, Wyoming (west of Rochelle Hills Escarpment, limited – ecoregion section not clear, whether

331F or 331G). That type may be equal to this type, which suggests that the type may be in Wyoming.

SIMILAR COMMUNITIES: CEGL001699 *Stipa comata – Bouteloua gracilis* Herbaceous Vegetation

OTHER NAMES: Agropyron spicatum/Bouteloua gracilis habitat type (Mueggler and Stewart (1980)

RELATION TO OTHER NAMES: =

COMMENTS ON OTHER NAMES:

ECOREGIONAL DISTRIBUTION: 331D Northwestern Glaciated Plains Section :C, 331E Northern Glaciated Plains Section :C, M332D Belt Mountains Section :?, M332E Beaverhead Mountains Section :C

STATE DISTRIBUTION: CO, MT

NORTHERN GREAT PLAINS NATIONAL FOREST DISTRIBUTION:

ENVIRONMENTAL DESCRIPTION: In Montana stands are found on toeslopes of the foothills and steeper slopes of valley bottoms. Soils are typically moderately deep (40 – 100 cm), with a variety of parent materials, and neutral in pH. Surface rock varies from 1 to 46% (Mueggler and Stewart 1980). Based on studies in southeastern Wyoming, *Bouteloua gracilis*, a C-4 grass, becomes a minor component of the grassland vegetation above 2,300 m, whereas *Stipa comata*, a C-3 grass, is present at over 2,600 m (Boutton et al. 1980).

VEGETATION DESCRIPTION: In Montana, the vegetation is open (40-60% cover) and dominated by graminoids. *Pseudoroegneria spicata* shares dominance with *Stipa comata. Bouteloua gracilis* is always present, but in varying amounts depending on grazing history (increasing with heavy grazing). Associated graminoids include *Carex stenophylla, Koeleria macrantha,* and *Poa sandbergii*. The most constant forbs include *Artemisia frigida* (sometimes classified as a shrub*), Phlox hoodii* and *Sphaeralcea coccinea*. Slightly more productive sites contain *Calamagrostis montanensis, Carex filifolia, Chrysopsis villosa*, and *Liatris punctata*. Shrub cover is less than 10%. Low growing shrubs include *Gutierrezia sarothrae* and *Opuntia polyacantha,* and taller shrubs may include *Chrysothamnus nauseosus* (Mueggler and Stewart 1980).

NATURAL DISTURBANCES: Fire and grazing are the most probably natural disturbances. Grazing by pronghorn antelope occurs during the growing season, and both mule deer and elk may utilize this type for winter range (Mueggler and Stewart 1980).

CONSERVATION RANK: G4

RANK JUSTIFICATION:

MANAGEMENT COMMENTS: Under heavy grazing *Pseudoroegneria spicata* and *Liatris punctata*, among others, decline in abundance, whereas *Artemisia frigida, Bouteloua gracilis*, and *Gutierrezia sarothrae* increase (see fuller list in Mueggler and Stewart 1980). *Stipa comata* may increase initially as *Pseudoroegneria spicata* declines, but will eventually decline as well. *Artemisia tridentata* and *Chrysothamnus spp*., normally incidental shrubs on this type, may increase to a level of dominance under persisent heavy grazing. Invasive species include *Bromus japonicus, Bromus tectorum, Centaurea maculosa, Cirsium vulgare, Taraxacum officinale,* and *Tragopogon dubius*. This type is more suitable for grazing by cattle and horses than by sheep, and optimal grazing periods appear to be spring and early fall. Pronghorn antelope utilize this type during the growing season, and mule deer and elk may utilize this type as winter range (Mueggler and Stewart 1980).

DATABASE CODE: CEGL001664

REFERENCES:

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Tiedemann, J.A., R.E. Francis, C. Terwilliger, Jr., and L.H. Carpenter. 1987. Shrub-steppe habitat types of Middle Park, Colorado. USDA Forest Service Res. Pap. RM-273. Rocky Mountain Forest and Range Experiment Station, Fort Collins, CO. 20 pp.

FORMATION: Medium-tall sod temperate or subpolar grassland (V.A.5.N.d)

CLASS: HERBACEOUS VEGETATION

FORMATION: MEDIUM-TALL BUNCH TEMPERATE OR SUBPOLAR GRASSLAND (V.A.5.N.D)
ALLIANCE: FESTUCA CAMPESTRIS HERBACEOUS ALLIANCE

FESTUCA CAMPESTRIS - FESTUCA IDAHOENSIS HERBACEOUS VEGETATION

COMMON NAME: Mountain Rough Fescue - Idaho Fescue

COLLOQUIAL NAME: Mountain Rough Fescue - Idaho Fescue Mixedgrass Prairie

COMMUNITY SUMMARY: *Festuca campestris – F. idahoensis* Herbaceous Vegetation is found in the northwestern Great Plains on moderate to steep mountain and foothill slopes. It is

found on both sides of the Continental Divide on mesic sites from 900 to 2100 m elevation on any aspect, becoming restricted to west and southwest-facing slopes further north. Soils are loamy and moderately deep on a variety of soil parent materials. This midgrass community is dominated by *F. campestris. F. idahoensis* is also abundant, but *F. campestris* generally has the greater canopy cover and is clearly dominant on undisturbed sites. *Carex obtusata* may be common, especially on more mesic sites. Other graminoids may also be found, including *Danthonia intermedia, Koeleria macrantha, Stipa richardsonii* and *S. occidentalis. Lupinus sericeus* and *Geranium viscosissimum* are not found in all stands but may be dominant in some. Additional forbs may include *Achillea millefolium, Galium boreale, Geum triflorum* and *Potentilla gracilis.*

CLASSIFICATION COMMENTS: Rough fescue (*Festuca scabrella*) is now generally recognized as a complex, consisting of three separate species (*Festuca campestris, F. altaica and F. hallii*) (Aiken and Darbyshire 1990). Some publications however treat the complex as a single species, *F. scabrella*. Of the species within the *F. scabrella* complex, *F. campestris* is the one most likely to be found with *F. idahoensis* at the western edge of the Great Plains (*ibid.*, Aiken *et al*. 1996). Confirmation is required that *F. campestris* is the species of rough fescue that occurs in this vegetation type.

The dominance of *F. campestris* with a significant cover of *F. idahoensis* defines this type. The absence or low cover of *Danthonia parryi* is also significant. *D. parryi* is commonly a third co-dominant in the Alberta foothills, forming a *F. campestris – F. idahoensis - D. parryi* type, usually associated with deeper soils. *D. parryi* has been noted as occasionally co-dominant with *F. scabrella* in northern Montana, east of the Continental Divide, but Mueggler and Stewart (1980) did not note enough other differences to define a separate type. Additional work is needed, but these likely should be considered two separate communities, given the extensive occurrence of the *F. campestris – F. idahoensis - D. parryi* type in Alberta.

Mueggler and Stewart (1980) recognize two phases of the *F. campestris – F. idahoensis* type. The *Geranium viscosissimum* phase is characterized by the presence of *G. viscosissimum* and *Potentilla gracilis*, with a greater abundance of *Stipa occidentalis* and *Pseudoroegneria spicata* than generally present in the rest of the type. The *Stipa richardsonii* phase is found on moist sites. It is similar to the *G. viscosissimum* phase, but with conspicuous cover of *S. richardsonii* and substantial *Carex filifolia* and *Danthonia intermedia.*

SIMILAR COMMUNITIES:

F. campestris – F. idahoensis - D. parryi has been described by a number of authors (*e.g*. Jaques 1979, Willoughby *et al*. 1998) It is considered the "modal grassland community type in Black Chernozemic soils in the foothills of southern Alberta" (Willoughby *et al*. 1998). Although *F. campestris* remains clearly dominant, it is separated from the *F. campestris – F. idahoensis* type by the prominence of *D. parryi*. Koterba and Habeck (1971) looked at grasslands along the North Fork Valley, Glacier National Park, Montana. They found stands in which *F. scabrella* was a common associate with *F. idahoensis*, but concluded that these grasslands in general represent a mixture of Great Plains and intermountain elements, making them floristically unusual. The *Festucetum Scabrella* association of Lynch (1955) in Glacier County, Montana is dominated by *F. scabrella* with *Festuca ovina* and *Stipa columbiana* also significant. As Lynch considers *F. idahoensis* to be an intergrading variety of *F. ovina*, this association appears to be similar to the *F. campestris – F. idahoensis* Herbaceous Vegetation type. Lynch notes similarities with other *F. scabrella* types in Alberta, Washington and Idaho.

Tisdale (1982) compared the plant communities documented in the Pacific Northwest Bunchgrass region. He found the *F. scabrella/F. idahoensis* types reported in Montana (Mueggler and Stewart 1980) and in Idaho (Tisdale 1979) to be similar, however a subsequent study (Tisdale and

Bramble-Brodahl 1983) did not note a *F. scabrella - F. idahoensis* type. Tisdale (1982) suggests that the relationship is unclear between similar types reported for British Columbia, Oregon and Washington.

Some stands of the *F. campestris – P. spicata – S. comata* vegetation type (CEGLO1629) may have a significant amount of *F. idahoensis*, making separation with the *F. campestris – F. idahoensis* vegetation type problematic. However, the presence of a number of Great Plains species in combination with *F. campestris* and *P. spicata* seem to separate the two types. Species reported as occurring regularly (>50% constancy) in the *F. campestris – P. spicata – S. comata* type but not reported for the *F. campestris – F. idahoensis* type include *Gaura coccinea, Gutierrezia sarothrae, Liatris punctata* and *Stipa comata* (Mueggler and Stewart 1980). Shrubs and *P. spicata* tend to be less prominent in the *F. campestris – F. idahoensis* type while *Danthonia intermedia, Stipa occidentalis and Carex* spp. are more prevalent (*ibid.)*. In addition, the *F. campestris – P. spicata – S. comata* type would tend to be found east of the Continental Divide at lower elevations and in more arid locations.

OTHER NAMES:

RELATION TO OTHER NAMES:

COMMENTS ON OTHER NAMES:

ECOREGIONAL DISTRIBUTION: Canada: Montane, Foothills Parkland and Foothills Fescue Grassland Natural Subregions

STATE DISTRIBUTION: This community is found in Montana, north of 46°, into southwestern Alberta.

NORTHERN GREAT PLAINS NATIONAL FOREST DISTRIBUTION:

ENVIRONMENTAL DESCRIPTION: This community is found on moderate to steep mountain and foothill slopes on both sides of the Continental Divide. It occurs on mesic sites from 900 to 2100 m elevation on any aspect, becoming restricted to west and southwest-facing slopes further north. Soils are loamy and moderately deep on a variety of soil parent materials.

VEGETATION DESCRIPTION: Although rich in forbs, this is a grassland community clearly dominated by *F. campestris* and *F. idahoensis.* Tussocks of the bunchgrass *F. campestris* are a prominent component with culms that may be taller than 75 cm. *Lupinus sericeus* and *Geranium viscosissimum* are not found in all stands but may be dominant in some. *Symphoricarpos occidentalis* and *Rosa arkansana* may occur in shallow depressions within the Fescue matrix.

NATURAL DISTURBANCES: Periodic fire may have been an important factor in the maintenance of these grasslands.

CONSERVATION RANK: G3

RANK JUSTIFICATION:

MANAGEMENT COMMENTS: Rough fescue is highly palatable throughout the grazing season. Summer overgrazing for 2 to 3 years can result in the loss of rough fescue in the stand (Hodgkinson and Young 1973). Although a light stocking-rate for 32 years did not affect range condition, a modest increase in stocking-rate led to a marked decline in range condition. The major change was a measurable reduction in basal area of rough fescue (Willms, Smoliak and Dormaar 1985). Long-term heavy grazing on moister sites can result in a shift to a Kentucky bluegrass – timothy type (Willoughby 1997). Willms and Fraser (1992) found rough fescue to be highly susceptible to grazing during the growing season, and conclude that optimum management

would include dormant season grazing. Mueggler and Stewart (1980) also suggest that rough fescue is least susceptible to grazing damage in fall and winter.

Rough fescue is well adapted to periodic burning. Burn intervals of 5 to 10 years have been recommended for fescue maintenance. Two to 3 years are needed to recover from a burn, so short fire return intervals impede fescue re-establishment. Longer intervals result in excessive litter buildup that causes high tussock mortality. Growing season burns reduce plant vigor and recovery takes longer. Floral development is initiated in the fall, so spring burning can result in a reduction in seed production. (FEIS).

Idaho fescue is also highly palatable in most seasons, but can withstand occasional heavy grazing. It is "a fire-sensitive species that can be severely damaged by summer and fall fires", and may take many years to recover its pre-fire cover. The size of clumps affects fire sensitivity, with smaller ones being less sensitive due to lower fuel buildup. Late summer (August) burns cause more damage than fall (September) burns (FEIS).

DATABASE CODE: CEGL001628

REFERENCES:

Aiken, S.G. and S.J. Darbyshire. 1990. Fescue Grasses of Canada. Agriculture Canada, Publication 1944/E. 113 pp.

Aiken, S.G., Dallwitz, M.J., McJannet, C.L., and Consaul, L.L. 1996 onwards. *Festuca* of North America: Descriptions, Illustrations, Identification, and Information Retrieval. Version: 2nd April 1998. URL http://biodiversity.uno.edu/delta/festuca/index.htm

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Koterba, W.D. and J.R. Habeck. 1971. Grassland of the North Fork Valley, Glacier National Park, Montana. Can. J. Bot. 49: 1627-1636.

Lynch, Brother D. 1955. Ecology of the Aspen Groveland in Glacier County, Montana. Ecological Monographs Vol. 25(4): 321-344.

Tisdale, E.W. 1979. A preliminary classification of Snake River canyon grassland in Idaho. U of Idaho FWR Exp. Sta. Note No. 32,Moscow, Idaho.

Tisdale, E.W. 1982. Grasslands of Western North America: the Pacific Northwest Bunchgrass. In Nicholson, McLean & Baker, ed., Grassland Ecology and Classification Symposium Proceedings June 1982. BC Ministry of Forests, Victoria BC. 223-245.

Tisdale, E.W. and M. Bramble-Brodahl. 1983. Relationships of site Characteristics to vegetation in Canyon Grasslands of West Central Idaho and Adjacent Areas. J. of Range Management 36(6): 775-778.

Mueggler, W.F. and W.L. Stewart. 1980. Grassland and shrubland habitat types of Western Montana. USDA Forest Service General Tech. Report INT-66. Intermountain Forest Range Experiment Station, Ogden, Utah. 155 pp.

Willms, W.D. and J. Fraser. 1992. Growth characteristics of rough fescue (*F. scabrella* var. *campestris*) after three years of repeated harvesting at scheduled frequencies and heights. Can. J. Bot. Vol. 70, 1992: 2125 – 2129.

Willms, W.D., S. Smoliak and J. F. Dormaar. 1985. Effects of Stocking rate on a Rough Fescue Grassland Vegetation. J. of Range Management 38(3), May 1985: 220 – 225.

Willoughby, M. 1997. Rangeland Reference Areas: Castle River Range Condition and Trend from 1953-1995. Environmental Protection, Lands and Forest Services, Edmonton, Alberta. 22 pp.

Willoughby, M., M.J. Alexander and K.M. Sundquist. 1998. Range Plant Community Types and Carrying Capacity for the Montane Subregion, Third approximation. Environmental Protection, Lands and Forest Services, Edmonton, Alberta. 145 pp.

CLASS: HERBACEOUS VEGETATION

FORMATION: MEDIUM-TALL BUNCH TEMPERATE OR SUBPOLAR GRASSLAND (V.A.5.N.D)
ALLIANCE: FESTUCA CAMPESTRIS HERBACEOUS ALLIANCE

FESTUCA CAMPESTRIS - PSEUDOROEGNERIA SPICATA – STIPA COMATA HERBACEOUS VEGETATION

COMMON NAME: Mountain Rough Fescue - Bluebunch Wheatgrass – Stipa comata Herbaceous Vegetation

COLLOQUIAL NAME: Mountain Rough Fescue - Bluebunch Wheatgrass – Needle-and-thread Mixedgrass Prairie

COMMUNITY SUMMARY: *Festuca campestris - Pseudoroegneria spicata - Stipa comata* Herbaceous Vegetation is found in the northwestern Great Plains, primarily east of the Continental Divide, on both level topography and steep slopes of all aspects. Soils are loamy, moderately deep, and developed on a variety of parent materials. This mid-grass community is fairly arid and heavily dominated by *Festuca campestris*. *Pseudoroegneria spicata* is abundant while *Festuca idahoensis* is generally common, although absent from some stands. Other graminoids that may be found are *Bouteloua gracilis, Muhlenbergia cuspidata* and *Stipa comata*. Forbs may include *Heterotheca villosa, Liatris punctata,* and *Lupinus sericeus*. The short shrubs *Artemisia frigida* and *Gutierrezia sarothrae* are also common.

CLASSIFICATION COMMENTS: Rough fescue (*Festuca scabrella*) is now generally recognized as a complex, consisting of three separate species (*Festuca campestris, F. altaica and F. hallii*) (Aiken and Darbyshire 1990). Some publications however treat the complex as a single species, *F. scabrella*. Of the species within the *F. scabrella* complex, *F. campestris* is the one most likely to be found with *Pseudoroegneria spicata* at the western edge of the Great Plains

(*ibid.*, Aiken *et al*. 1996). Confirmation is required that *F. campestris* is the species of rough fescue that occurs in this vegetation type.

Tisdale (1982) notes that vegetation in Montana east of the Continental Divide is complex, reflecting a transition to the Great Plains. The plant communities often include Great Plains elements not found west of the Divide. This appears to be the situation for the *F. campestris – P. spicata* (syn. *Agropyron spicatum*) *– S. comata* herbaceous vegetation type. *S. comata* is prevalent, and compared to similar types west of the Divide, there is an increased abundance of *Allium cernuum, Artemisia frigida, Bouteloua gracilis* and *Liatris punctata*.

SIMILAR COMMUNITIES: Similar communities with *F. campestris* and *P. spicata* as dominant species are found on both sides of the Continental Divide in Montana, north into British Columbia and Alberta (*e.g*. Tisdale 1947 and Achuff *et al.* 1997). There are however significant floristic differences, with those stands west of the Divide generally lacking the Great Plains elements diagnostic of the *F. campestris – P. spicata - S. comata* herbaceous vegetation type. Other species, including *Balsamorhiza sagittata, Besseya wyomingensis, Castilleja lutescens* and *Lomatium triternatum* are more prominent. Although east of the Continental Divide, the *F. campestris – P. spicata* communities in SW Alberta lack the Great Plains elements, and include many of the elements usually found west of the Divide.

Some stands of the *F. campestris – P. spicata – S. comata* vegetation type may have a significant amount of *F. idahoensis*, making separation with the *F. campestris – F. idahoensis* vegetation type (CEGLO1628) problematic. The presence however of a number of Great Plains' species in combination with *F. campestris* and *P. spicata* seem to separate the two types. Species reported as occurring regularly (>50% constancy) in the *F. campestris – P. spicata – S. comata* type, but not reported for the *F. campestris – F. idahoensis* type, include *Gaura coccinea, Gutierrezia sarothrae*, *Liatris punctata* and *Stipa comata* (Mueggler and Stewart 1980). Shrubs and *P. spicata* tend to be less prominent in the *F. campestris – F. idahoensis* type while *Danthonia intermedia, Stipa occidentalis and Carex* spp. are more prevalent (*ibid.)*. In addition, the *F. campestris – F. idahoensis* tends to be found at higher elevation and in more mesic locations.

OTHER NAMES: *Festuca scabrella/Agropyron spicatum* habitat type, *Stipa comata* phase (Mueggler and Stewart 1980).

RELATION TO OTHER NAMES: =

COMMENTS ON OTHER NAMES: Mueggler and Stewart (1980) note differences in species composition east and west of the Continental Divide, separating out the *F. campestris – P. spicata - S. comata* herbaceous vegetation type as the *Stipa comata* phase under their *F. scabrella/ Agropyron spicatum* habitat type.

ECOREGIONAL DISTRIBUTION:

STATE DISTRIBUTION: This community in known to occur in Western Montana, north from about 46° latitude (Mueggler and Stewart 1980).

NORTHERN GREAT PLAINS NATIONAL FOREST DISTRIBUTION:

ENVIRONMENTAL DESCRIPTION: Stands of this type occur on both level topography and steep slopes of all aspects. Sites are usually fairly arid and found primarily east of the Continental Divide. Soils are loamy and moderately deep, on a variety of parent materials.

VEGETATION DESCRIPTION: This grassland is dominated by bunch grasses, primarily mountain rough fescue. There is a diversity of forbs, contributing significant cover but few or no shrubs.

NATURAL DISTURBANCES:

CONSERVATION RANK: G4

RANK JUSTIFICATION: Because this is a split of a broader type, the rank should probably be reviewed.

MANAGEMENT COMMENTS: Rough fescue is highly palatable throughout the grazing season. Summer overgrazing for 2 to 3 years can result in the loss of rough fescue in the stand (Hodgkinson and Young 1973). Although a light stocking rate for 32 years did not affect range condition, a modest increase in stocking rate led to a marked decline in range condition. The major change was a measurable reduction in basal area of rough fescue (Willms, Smoliak and Dormaar 1985).

Long-term heavy grazing on moister sites can result in a shift to a Kentucky bluegrass – timothy type (Willoughby 1997). Tisdale (1947) found that invaders such as *Tragopogon dubius,* and *Bromus tectorum* move in in response to grazing on drier sites. In some locations, *Selaginella densa* and *Juniperus horizontalis* may increase with grazing (S. Cooper, pers. comm.). Willms and Fraser (1992) found rough fescue to be highly susceptible to grazing during the growing season, and conclude that optimum management would include dormant season grazing. Mueggler and Stewart (1980) also suggest that rough fescue is least susceptible to grazing damage in fall and winter.

Rough fescue is well adapted to periodic burning. Burn intervals of 5 to 10 years have been recommended for fescue maintenance. Two to 3 years are needed to recover from a burn, so short fire return intervals impede fescue re-establishment. Longer intervals result in excessive litter buildup that causes high tussock mortality. Growing season burns reduce plant vigor and recovery takes longer. Floral development is initiated in the fall, so spring burning can result in a reduction in seed production. (FEIS).

Bluebunch wheatgrass shows an inconsistent reaction to grazing, increasing on some grazed sites while decreasing on others. It seems to recover more quickly from overgrazing than rough fescue (Mueggler and Stewart 1980). It tolerates dormant-period grazing well, but is sensitive to defoliation during the growing season. Light spring use or fall grazing can help retain plant vigor. Plants usually survive fire, but regrowth may be variable. It is particularly sensitive to defoliation in late spring (FEIS).

DATABASE CODE: CEGL001629

REFERENCES:

Achuff, P.L., R.L. McNeill and M.L. Coleman. 1997. Ecological Land Classification of Waterton Lakes National Park, Alberta. Waterton Lakes National Park. Waterton Park, Alberta, 220 pp + maps.

Aiken, S.G. and S.J. Darbyshire. 1990. Fescue Grasses of Canada. Agriculture Canada, Publication 1944/E: 113 pp.

Aiken, S.G., Dallwitz, M.J., McJannet, C.L., and Consaul, L.L. 1996 onwards. *Festuca* of North America: Descriptions, Illustrations, Identification, and Information Retrieval. Version: 2nd April 1998. URL http://biodiversity.uno.edu/delta/festuca/index.htm.

Fire Effects Information System (FEIS), 1995, USDA Forest Service, http://www.fs.fed.us/database/feis

Hodgkinson, H.S. and A.E. Young. 1973. Rough fescue (*Festuca scabrella* Torr.) in Washington. J of Range Management 26(1):25 – 26.

Mueggler, W.F. and W.L. Stewart. 1980. Grassland and shrubland habitat types of Western Montana. USDA Forest Service General Tech. Report INT-66. Intermountain Forest Range Experiment Station, Ogden, Utah. 155 pp.

Tisdale, E.W. 1947. The Grasslands of the Southern Interior of British Columbia. Ecology, Vol. 28(4): 346-382.

Tisdale, E.W. 1982. Grasslands of Western North America: the Pacific Northwest Bunchgrass. In Nicholson, McLean and Baker, ed., Grassland Ecology and Classification Symposium Proceedings June 1982. BC Ministry of Forests, Victoria BC: 223-245.

Willms, W.D. and J. Fraser. 1992. Growth characteristics of rough fescue (*F. scabrella* var. *campestris*) after three years of repeated harvesting at scheduled frequencies and heights. Can. J. Bot. Vol. 70, 1992: 2125-2129.

Willms, W.D., S.Smoliak and J. F. Dormaar. 1985. Effects of Stocking rate on a Rough Fescue Grassland Vegetation. J. of Range Management 38(3), May 1985: 220-225.

Willoughby, M. 1997. Rangeland Reference Areas: Castle River Range Condition and Trend from 1953-1995. Environmental Protection, Lands and Forest Services, Edmonton, Alberta. 22 pp.

CLASS: HERBACEOUS VEGETATION

FORMATION: MEDIUM-TALL BUNCH TEMPERATE OR SUBPOLAR GRASSLAND (V.A.5.N.D)
ALLIANCE: FESTUCA IDAHOENSIS HERBACEOUS ALLIANCE

FESTUCA IDAHOENSIS - CAREX INOPS SSP. HELIOPHILA HERBACEOUS VEGETATION

COMMON NAME: Idaho Fescue - Long-Stolon (Sun) Sedge Herbaceous Vegetation

COLLOQUIAL NAME: Idaho Fescue - Sedge Mixedgrass Prairie

COMMUNITY SUMMARY: The *Festuca idahoensis - Carex inops* ssp. *heliophila* herbaceous vegetation type is found in the Northern Great Plains on upland plateaus and in open areas surrounded by ponderosa pine forest. It is found on moderate slopes (5 to 15%) of all aspects at around 1200 m elevation. Soils tend to range from loam to sandy loam. *F. idahoensis* is clearly dominant and *C. inops* ssp. *heliophila* (syn. *C. heliophila*) is constant and abundant. Also usually present are *Koeleria macrantha (*syn. *K. pyramidata*), *Artemisia ludoviciana, Aster ericoides* and

Pascopyrum smithii (syn. *Agropyron smithii*). *Stipa comata* is often present, but only as a minor component of the vegetation.

CLASSIFICATION COMMENTS: This vegetation type was documented on an unglaciated landscape and may not occur on the glaciated portions of the Great Plains. The *F. idahoensis – C. inops* ssp. *heliophila* herbaceous vegetation type is separated from *S. comata – C. inops* ssp. *heliophila* of Hansen and Hoffman (1988) by the predominance of *F. idahoensis* and by the lack of significant cover of *S. comata*. The *F. idahoensis – C. inops* ssp. *heliophila* type also has less forb coverage, less leaf litter and more exposed soil (*ibid.*).

SIMILAR COMMUNITIES: Several studies have documented *F. idahoensis* types that have *Carex spp.* as a dominant associate. Generally however, the species of *Carex* noted as predominant is different. *C. obtusata* is listed as a main component for a number of types (Hansen and Hoffman 1988). Mueggler and Stewart (1980) note a *F. idahoensis - C. filifolia* habitat type.

OTHER NAMES:

RELATION TO OTHER NAMES:

COMMENTS ON OTHER NAMES:

ECOREGIONAL DISTRIBUTION:

STATE DISTRIBUTION: This community is found in Montana.

NORTHERN GREAT PLAINS NATIONAL FOREST DISTRIBUTION: Custer National Forest, Ashland District

ENVIRONMENTAL DESCRIPTION: The *F. idahoensis – C. inops* ssp. *heliophila* herbaceous vegetation type is found on moderate slopes (5 to 15%) of all aspects at around 1200 m elevation. Soils tend to range from loam to sandy loam.

VEGETATION DESCRIPTION: Shrubs and forbs are present, but this type is clearly dominated by graminoids, with *F. idahoensis* being the most prominent species. There is often some exposed soil.

NATURAL DISTURBANCES:

CONSERVATION RANK: G3

RANK JUSTIFICATION:

MANAGEMENT COMMENTS: Idaho fescue is highly palatable in most seasons and can withstand occasional heavy grazing. It is “a fire-sensitive species that can be severely damaged by summer and fall fires”, and may take many years to recover its pre-fire cover. The size of each clump affects fire sensitivity, with smaller clumbs considered less sensitive due to lower fuel buildup. Late summer (August) burns cause more damage than fall (September) burns (FEIS).

Information is mixed on the effects of grazing and burning on *C. inops* ssp. *heliophila*. Some studies suggest the species increases with both spring burning and with grazing, while others show the reverse. On somewhat mesic sites, grazing or burning may result in a drier microenvironment, favoring *C. inops* ssp. *heliophila*. On already dry sites, grazing or burning may reduce the cover of upland sedges (FEIS).

DATABASE CODE: CEGL001610

REFERENCES:

Fire Effects Information System (FEIS), 1995, USDA Forest Service, http://www.fs.fed.us/database/feis

Hansen, P.L. and G.R. Hoffman. 1988. The vegetation of the Grand River/Cedar River, Sioux, and Ashland Districts of the Custer National Forest: A Habitat Type classification. USDA Forest Service. General Technical Report RM-157.

Mueggler, W.F. and W.L. Stewart. 1980. Grassland and shrubland habitat types of Western Montana. USDA Forest Service General Tech. Report INT-66. Intermountain Forest Range Experiment Station, Ogden, Utah. 155 pp.

CLASS: HERBACEOUS VEGETATION

FORMATION: MEDIUM-TALL BUNCH TEMPERATE OR SUBPOLAR GRASSLAND (V.A.5.N.D)
ALLIANCE: FESTUCA IDAHOENSIS HERBACEOUS ALLIANCE

FESTUCA IDAHOENSIS - PASCOPYRUM SMITHII HERBACEOUS VEGETATION

COMMON NAME: Idaho Fescue-Western Wheatgrass

COLLOQUIAL NAME: Idaho Fescue - Western Wheatgrass Mixedgrass Prairie

COMMUNITY SUMMARY: *Festuca idahoensis - Pascopyrum smithii* herbaceous vegetation occurs primarily east of the Continental Divide on gentle slopes. It is found on moderately deep soils of sedimentary origin, generally from 1200 to 1800 m elevation, but may be found up to 2400 m. *F. idahoensis* is the dominant graminoid, but wheatgrasses including *Pascopyrum smithii* and/or *Elymus lanceolatus* may be abundant. *Pascopyrum smithii* appears to become restricted in distribution to the north. In Alberta, it is restricted to swales or to specific soil types and *Elymus lanceolatus* becomes the prominent wheatgrass. *Koeleria macrantha* is also an important component of this type. *Poa cusickii* is often conspicuous; growing with or replacing *Poa sandbergii*. Graminoids are far more abundant than shrubs and forbs. The most prominent forbs are *Phlox hoodii, Gaillardia aristata, Antennaria rosea* and *Achillea millefolium.* The short shrub, *Artemisia frigida* may be present. Other shrubs are absent or scattered.

CLASSIFICATION COMMENTS: This type can be recognized by the dominance of *F. idahoensis*, and the presence and often abundance of *Pascopyrum smithii* (syn. *Agropyron smithii*) and/or *Elymus lanceolatus* (syn. *Agropyron dasystachyum*). *Pascopyrum smithii* seems to be more prominent to the south, *Elymus lanceolatus* to the north. *F. scabrella* and *Pseudoroegneria spicata* are only minor components, if present at all. Which species of the *F. scabrella* complex occurs in this type has yet to be determined, but based on the distributions of the species, it seems most likely to be *F. campestris.*

Tisdale (1982) considers *Festuca idahoensis - Pascopyrum smithii* herbaceous vegetation to be an example of an association that is a result of the interface between the Pacific Northwest bunchgrass and the Great Plains grasslands. He suggests that this is one of a number of types essentially unique to Montana, resulting from the extensive, complex intermingling between the two grassland types. Mueggler and Stewart (1980) suggest that this type is found in the plains/mountains transition area from Wyoming to the Canadian border. In Alberta, a similar type has been documented, but with *Elymus lanceolatus* as the predominant wheatgrass (B. Adams, pers. comm.). Additional work is required to determine if these should be split out as different types.

SIMILAR COMMUNITIES:

OTHER NAMES:

RELATION TO OTHER NAMES:

COMMENTS ON OTHER NAMES:

ECOREGIONAL DISTRIBUTION: Canada: Foothills Parkland and Foothills Fescue Grassland Natural

Subregions

STATE DISTRIBUTION: Montana, Wyoming and Alberta.

NORTHERN GREAT PLAINS NATIONAL FOREST DISTRIBUTION:

ENVIRONMENTAL DESCRIPTION: *Festuca idahoensis - Pascopyrum smithii* herbaceous vegetation occurs primarily east of the Continental Divide on gentle slopes. It is found on moderately deep soils of sedimentary origin, generally from 1200 to 1800 m elevation, but may be found up to 2400 m.

VEGETATION DESCRIPTION: This is a mid-grass type in which grasses are predominant. There is little bare ground and shrubs and forbs form only a minor component. *F. idahoensis* is clearly dominant. Wheatgrasses including *Pascopyrum smithii* and/or *Elymus lanceolatus* may be abundant. *Pascopyrum smithii* appears to become restricted in distribution to the north. In Alberta, it is restricted to swales or to specific soil types and *Elymus lanceolatus* becomes the prominent wheatgrass. *Koeleria macrantha* is also an important component of these grasslands.

NATURAL DISTURBANCES: This type may be adapted to periodic fire.

CONSERVATION RANK: G4

RANK JUSTIFICATION:

MANAGEMENT COMMENTS: Western wheatgrass can tolerate moderate grazing, but is damaged by close spring grazing. Plants increase in density and abundance after fire, with rapid post-burn recovery. It is a species that is favored by annual spring burning. Fall burning also stimulated productivity, but to a lesser extent (FEIS).

Idaho fescue is highly palatable in most seasons, and can withstand occasional heavy grazing. It is “a fire-sensitive species that can be severely damaged by summer and fall fires”, and may take many years to recover its pre-fire cover. The size of each clump affects fire sensitivity, with smaller ones being less sensitive due to lower fuel buildup. Late summer (August) burns cause more damage than fall (September) burns (FEIS).

DATABASE CODE: CEGL001621

REFERENCES:

Adams, B. 1998. Public Lands, Alberta Agriculture, Food and Rural Development, Lethbridge. Personal Communication.

Fire Effects Information System (FEIS), 1995, USDA Forest Service, http://www.fs.fed.us/database/feis

Mueggler, W.F. and W.L. Stewart. 1980. Grassland and shrubland habitat types of Western Montana. USDA Forest Service General Tech. Report INT-66. Intermountain Forest Range Experiment Station, Ogden, Utah. 155 pp.

Tisdale, E.W. 1982. Grasslands of Western North America: the Pacific Northwest Bunchgrass. In Nicholson, McLean and Baker, ed., Grassland Ecology and Classification Symposium Proceedings June 1982. BC Ministry of Forests, Victoria BC: 223-245.

CLASS: HERBACEOUS VEGETATION

FORMATION: MEDIUM-TALL BUNCH TEMPERATE OR SUBPOLAR GRASSLAND (V.A.5.N.D)
ALLIANCE: PSEUDOROEGNERIA SPICATA HERBACEOUS ALLIANCE

PSEUDOROEGNERIA SPICATA - BOUTELOUA CURTIPENDULA HERBACEOUS VEGETATION

COMMON NAME: Bluebunch Wheatgrass-Side Oats Grama

COLLOQUIAL NAME: Bluebunch Wheatgrass - Sideoats Grama Mixedgrass

COMMUNITY SUMMARY: This mixedgrass association ranges in size from small to large patches which are located on foothills and sideslopes along major drainages between the Tongue and Powder Rivers of southeastern Montana. This type is considered a topoedaphic climax by Hansen and Hoffman (1988) because it occurs on moderate to steep (>45%) slopes the surfaces of which are strewn with large amounts of irregularly shaped, iron oxide porcelainite shale (scoria). The surface resulted from fires in contiguous coal beds (but the soils are conventional loams). The harsh sites of this type result in a unique depauperate community with the lowest total cover and graminoid cover of any southeastern Montana type inventoried by Hansen and Hoffman (1988). However, it is still has greater cover and is more productive than those communities associated with bentonite deposits and acid shales. *Pseudoroegneria spicata* is strongly dominant (canopy cover ranging from 40-60%) with *Bouteloua curtipendula* exhibiting less than one fourth this value. *Agropyron smithii* and *Schizachyrium scoparium* are consistently present with cover less than 10%. Forbs are a minor component with *Lygodesmia juncea*, *Echinacea angustifolia* and *Psoralea argophylla* having the highest fidelity to the type.

CLASSIFICATION COMMENTS: *P. spicata – B. curtipendula* appears to be endemic to southeastern Montana, occurring between the Tongue and Powder Rivers. Other portions of southeastern Montana and adjacent Wyoming would appear to have appropriate habitat (soils derived from scoria clinker), but lack populations of *B. curtipendula* or *P. spicata* because they are at the extreme western and eastern extensions of their respective ranges and consequently sporadically distributed. There would seem to be some sites intermediate between *Rhus trilobata / Pseudoroegneria spicata* and this type and for which it would be a help to have an arbitrary cover cutoff value for *R. trilobata* for assigning stands to types. In the Rapid Ecological Assessment of the Northern Great Plains this type was recorded but once (Martin et al. 1998).

SIMILAR COMMUNITIES*: Rhus trilobata / Pseudoroegneria spicata* Herbaceous Vegetation (CEGL001120) differs from this community by having R. trilobata dominant or at least well represented. *Pseudoroegneria spicata - Carex filifolia* Herbaceous Vegetation (CEGL001665) differs from this association by lacking *B. curtipendula* and having *C. filifolia* with at least 5% cover, though it may not be the dominant graminoid. *Pseudoroegneria spicata – Bouteloua gracilis* Herbaceous Vegetation (CEGL001664) of western Montana occurs for the most part west of the distribution of *B. curtipendula* and where *B. gracilis* is the undergrowth dominant.

OTHER NAMES: *Agropyron spicatum – Bouteloua curtipendula* Habitat Type (Hansen and Hoffman 1988)

RELATION TO OTHER NAMES: =|

COMMENTS ON OTHER NAMES:

ECOREGIONAL DISTRIBUTION: Subsections e & c of Powder River Basin Section (331G):CC

STATE DISTRIBUTION: This association has been recorded for only southeastern Montana, though appropriate habitat ostensibly occurs in northeastern Wyoming and westernmost North Dakota.

NORTHERN GREAT PLAINS NATIONAL FOREST DISTRIBUTION: Custer National Forest, Ashland District

ENVIRONMENTAL DESCRIPTION: This type occurs as small to large patches located on foothills and sideslopes along major drainages between the Tongue and Powder Rivers of southeastern Montana; known elevations range between 3,100 and 3,800 ft. This type is considered a topoedaphic climax by Hansen and Hoffman (1988) because it occurs on moderate to steep (>45%) slopes, the surfaces of which are strewn with large amounts of irregularly shaped, iron oxide porcelainite shale (scoria) that has resulted from ancient fires in contiguous coal beds. The soils are conventional loams, but shallow and excessively drained.

VEGETATION DESCRIPTION: *Pseudoroegneria spicata* is strongly dominant (canopy cover ranging from 40-60%) with *Bouteloua curtipendula* exhibiting less than one fourth this cover value. *Agropyron smithii* and *Schizachyrium scoparium* are consistently present with cover less than 10%. Forbs are a minor component with *Lygodesmia juncea, Echinacea angustifolia* and *Psoralea argophylla* having the highest fidelity to the type. The shrubs (subshrubs) *Rhus trilobata, Gutierrizia sarothrae* and *Artemisia frigida* are consistently present with low coverage values (less than 5%).

NATURAL DISTURBANCES: Given the low cover and patchiness of this type, fires probably burned in a mosaic fashion with reduced intensity. Pronghorn antelope use these sites for grazing and predator detection.

CONSERVATION RANK: G3

RANK JUSTIFICATION: As currently understood, this type is restricted both geographically and with regard to site parameters. However, appropriate habitat in WY overlaps the distribution of the characteristic species so inventory may yield more occurrences. Threats to this type could potentially come from domestic stock but sites are generally somewhat removed from water. These sites are generally not conducive to alien *Bromus* specieis, but their potential to support other weeds is unknown.

MANAGEMENT COMMENTS: These sites support a number of palatable grasses but only *P. spicata* would be a consistent draw for cattle; however, the unfavorable landscape position should tend to discourage grazing use. The steep slopes and unconsolidated nature of the substrate can result in excessive erosion with disturbance.

DATABASE CODE: CEGL001663

REFERENCES:

Hansen, P.L. and G.R. Hoffman. 1988. The vegetation of the Grand River/Cedar River, Sioux, and Ashland Districts of the Custer National Forest: a habitat type classification. USDA Forest Service General Technical Report RM-157, Rocky Mountain Forest and Range Experiment Station, Fort Collins, CO. 68 pp.

CLASS: HERBACEOUS VEGETATION

FORMATION: MEDIUM-TALL BUNCH TEMPERATE OR SUBPOLAR GRASSLAND (V.A.5.N.D)
ALLIANCE: PSEUDOROEGNERIA SPICATA HERBACEOUS ALLIANCE

COMMON NAME: Bluebunch Wheatgrass-Threadleaf Sedge

COLLOQUIAL NAME: Bluebunch Wheatgrass - Thread-Leaved Sedge Mixed Prairie

COMMUNITY SUMMARY: This is a herbaceous vegetation type in which graminoids contribute most of the cover. A number of forbs may be present, but forbs and shrubs contribute little cover to the vegetation. *Pseudoroegneria spicata* dominates the vegetation, and *Carex filifolia* contributes substantial cover. Small amounts of *Bouteloua gracilis* may be present. Stands of this association occur on level or gently sloping upland sites with loam or silt loam soils.

CLASSIFICATION COMMENTS: This association seems to resemble very closely, in environment and vegetation, the more widespread *P. spicata - Bouteloua gracilis* association, except that this association contains little or no *B. gracilis*. The geographic ranges of the two associations overlap, and it is unclear whether good reasons exist to differentiate the two.

SIMILAR COMMUNITIES: The *Pseudoroegneria spicata - Bouteloua gracilis* association is dominated by *P. spicata*, and stands of that association may also contain substantial amounts of *Carex filifolia*. But in that association, *Bouteloua gracilis* contributes as much cover as does *C. filifolia*, while in this association, *B. gracilis* contributes substantially less cover than does *C. filifolia*.

OTHER NAMES: *Agropyron spicatum* / *Carex filifolia* habitat type (Hansen and Hoffman 1988)|*Agropyron spicatum* communities (Despain 1973)|*Roegneria spicata* / *Carex filifolia* plant association (Johnston 1987)

RELATION TO OTHER NAMES: -|-|-

COMMENTS ON OTHER NAMES: Hansen's and Hoffman's (1988) habitat type supports this association in southeastern Montana.|Despain's (1973) description of the vegetation on the western slope of the Bighorn Mountains is brief, but his grassland communities appear to belong to this association.|Johnston's (1987) plant association is taken from Hansen and Hoffman (1988).

ECOREGIONAL DISTRIBUTION: 331G:CC|331F:CP|342A:CC|M331B:PP

STATE DISTRIBUTION: This association has been described from two stands in southeastern Montana (Hansen and Hoffman 1988) and from two stands (Fisser 1964) and cursory information (Despain 1973) in north-central Wyoming.

NORTHERN GREAT PLAINS NATIONAL FOREST DISTRIBUTION: The association has been described from the Ashland District of the Custer National Forest (Hansen and Hoffman 1988).

ENVIRONMENTAL DESCRIPTION: Stands of this association have been described from nearly level sites (some windswept) with loam and silt loam soils. Elevations range from ca. 4,100 feet on the Great Plains to ca. 7,0000 feet on the west flank of the Bighorn Mountains.

VEGETATION DESCRIPTION: Graminoids contribute most of the cover, and forbs are secondary; shrubs may be present as scattered individuals or clumps that contribute little cover to the vegetation. *Pseudoroegneria spicata* dominates the vegetation, and *Carex filifolia* contributes substantial cover. *Stipa comata*, *Koeleria macrantha*, and *Carex heliophila* (in Great Plains stands) often are present in smaller amounts, but they may contribute as much cover as does *C. filifolia*. *Bouteloua gracilis* is absent or present only in small amounts. Cheatgrass (*Bromus japonicus, B. tectorum*) is present in many stands and may contribute nearly as much cover as does *P. spicata*. The vegetation may contain small amounts of numerous forbs. Shrubs are

absent or present only as scattered individuals (especially *Artemisia tridentata* ssp. *wyomingensis*), but the sub-shrubs *Artemisia frigida* and *Gutierrezia sarothrae* usually are present in small amounts.

NATURAL DISTURBANCES:

CONSERVATION RANK: G4

RANK JUSTIFICATION: The rank for this association should be reviewed in light of the apparent rarity of this association.

MANAGEMENT COMMENTS: By comparing a lightly grazed pasture with an adjacent pasture heavily grazed by bison, Fisser (1964) concluded that grazing causes *Pseudoroegneria spicata*, *Carex filifolia*, and *Stipa comata* to decrease, and *Bouteloua gracilis*, *Bromus tectorum*, *Artemisia tridentata*, and *Chrysothamnus* spp. To increase.

DATABASE CODE: CEGL001665

REFERENCES:

Despain, D.G. 1973. Vegetation of the Big Horn Mountain, Wyoming, in relation to substrate and climate. Ecological Monographs 43: 329-355.

Fisser, H.G. 1964. Range survey in Wyoming's Big Horn Basin. Wyoming Agricultural Experiment Station Bulletin 424.

Hansen, P.L. and G.R. Hoffman. 1988. The vegetation of the Grand River/Cedar River, Sioux, and Ashland Districts of the Custer National Forest: a habitat type classification. USDA Forest Service General Technical Report RM-157, Rocky Mountain Forest and Range Experiment Station, Fort Collins CO. 68 pp.

Johnston, B.C. 1987. Plant associations of Region Two. Edition 4. USDA Forest Service, Rocky Mountain Region. R2-ECOL-87-2. 429 pp.

CLASS: HERBACEOUS VEGETATION

FORMATION: MEDIUM-TALL BUNCH TEMPERATE OR SUBPOLAR GRASSLAND (V.A.5.N.D)
ALLIANCE: PSEUDOROEGNERIA SPICATA HERBACEOUS ALLIANCE

PSEUDOROEGNERIA SPICATA - PASCOPYRUM SMITHII HERBACEOUS VEGETATION

COMMON NAME: Bluebunch Wheatgrass-Western-Wheat Grass

COLLOQUIAL NAME: Bluebunch Wheatgrass - Western Wheatgrass Mixed Grass Prairie

COMMUNITY SUMMARY: This grassland association is found in the northern Great Plains and in the eastern foothills of the northern U.S. Rocky Mountains. Stands generally grow on slopes with shallow soils. *Pseudoroegneria spicata* dominates the vegetation, and rhizomatous wheatgrasses (*Pascopyrum smithii* or *Elymus lanceolatus*) are abundant. Forbs and shrubs contribute little cover.

CLASSIFICATION COMMENTS: The inclusion of Hansen's and Hoffman's (1988) stand number 25 from southeastern Montana extends the range of variability in vegetation found in this association. That stand contains *Bouteloua curtipendula* as an important species, and its inclusion in this association may be inappropriate. Similarly, it is unclear how much *Bouteloua gracilis* and *Carex filifolia* should be allowed in the vegetation for a stand to be placed into this association.

SIMILAR COMMUNITIES: In the *Pseudoroegneria spicata - Poa secunda* association, rhizomatous wheatgrasses are absent or contribute little cover.

OTHER NAMES: *Agropyron spicatum* / *Agropyron smithii* habitat type (Mueggler and Stewart 1980)|*Agropyron spicatum - Agropyron smithii* community type (Cooper et al. 1995)|*Agropyron spicatum* / *Agropyron smithii* habitat type (Tweit and Houston 1980)|*Pseudoroegneria spicata* / *Pascopyrum smithii* plant community (DeVelice et al. 1991)|*Agropyron spicatum* / *Bouteloua curtipendula* habitat type (Hansen and Hoffman 1988)|*Roegneria spicata* / *Elytrigia smithii* plant association (Johnston 1987)|*Agropyron spicatum* / *Stipa comata* plant association (Terwilliger et al. 1979).|*Agropyron spicatum - Agropyron smithii* habitat type (Jorgensen 1979).

RELATION TO OTHER NAMES: +|-|+|-|+|=|?|+

COMMENTS ON OTHER NAMES: Mueggler's and Stewart's (1980) habitat type supports stands of this association in central Montana.|Cooper et al. (1995) describe this association as it occurs in the foothills of southwestern Montana.|Tweit's and Houston's (1980) habitat type supports this association in northwestern Wyoming.|The community of DeVelice et al. (1991) represents this association in northern Montana.|Hansen's and Hoffman's (1988) habitat type in southeastern Montana apparently supports stands belonging to this association (Table A-8, stand 25).|Johnston's (1987) plant association appears to be essentially the same as this one.|Terwilliger's et al. (1979) *A. spicatum* / *Stipa comata* plant association is included here because Johnston (1987) identifies it as part of his *Roegneria spicata* / *Elytrigia smithii* association. Terwilliger's et al. (1979) may contain stands that belong in this association, although the composition of the vegetation in their association is unclear.|On Jorgensen's (1979) habitat type in west-central Montana, *Stipa comata* often co-dominates the vegetation.

ECOREGIONAL DISTRIBUTION:
331D:CC|331F:CC|331G:CP|342A:CC|M331A:CC|M332D:CC|M332E:CC

STATE DISTRIBUTION: This association has been described from western and central Montana (Jorgensen 1979, Mueggler and Stewart 1980, Cooper et al. 1995), northeastern Montana (DeVelice et al. 1991), southeastern Montana (Hansen and Hoffman 1988), northwestern and west-central Wyoming (Tweit and Houston 1980), and apparently from northeastern Wyoming (Terwilliger et al. 1979).

NORTHERN GREAT PLAINS NATIONAL FOREST DISTRIBUTION: This association apparently occurs on the Ashland District of the Custer National Forest (Hansen and Hoffman 1988, Table A-8, stand 25) and on the Thunder Basin National Grassland (Terwilliger et al. 1979.) It probably also can be found on the Little Missouri National Grassland.

ENVIRONMENTAL DESCRIPTION: Stands of this grassland association grow over a broad elevation range, from 2,600 feet in Great Plains to 7,500 feet in the foothills of the Rocky Mountains. They occur on slopes, from gentle alluvial fans to slopes as steep as 40%, facing all aspects. Substrates are glacial deposits, alluvium, limestone, and calcareous sandstones. Soils usually are shallow, may contain a substantial volume of coarse fragments, and belong to sandy clay loam, loam, or clay loam textural classes. The sites often are exposed to strong, persistent winds.

VEGETATION DESCRIPTION: Grasses contribute most of the cover and production. *Pseudoroegneria spicata* dominates (usually strongly) and the rhizomatous wheatgrasses *Pascopyrum smithii* or *Elymus lanceolatus* (or both) are secondary species, but the rhizomatous wheatgrasses may co-dominate with *P. spicata*. *Stipa comata, Koeleria macrantha,* and *Poa secunda* usually are present in smaller amounts, but *S. comata* often co-dominates in west-central Montana (Jorgensen 1979). *Bouteloua gracilis* is absent or is a minor species. *Nassella viridula* contributes substantial cover in some stands, especially in the Great Plains but also in some foothills stands (Mueggler's and Stewart's [1980] *Stipa viridula* phase). Stands in the foothills often contain *Poa cusickii, Festuca kingii* (syn. *Leucopoa kingii*), and *Calamagrostis montanensis*. In southeastern Montana (Hansen and Hoffman 1988) and northeastern Wyoming (Terwilliger et al. 1979), *Bouteloua curtipendula* may also occur in the vegetation. Forbs contribute little cover or production, but a number of species may be present, including *Ambrosia psilostachya* (in Great Plains stands), *Draba oligosperma, Erigeron compositus, Haplopappus acaulis, Heterotheca villosa, Sphaeralcea coccinea, Phlox hoodii, Tragopogon dubius,* and *Vicia americana*. The sub-shrubs *Artemisia frigida* and *Gutierrezia sarothrae* usually are present in small amounts. Shrubs generally are absent or are present only as scattered individuals, but Tweit and Houston (1980) note that *Tetradymia canescens* may be common and *Chrysothamnus* spp. May form a distinct shrub layer in disturbed stands.

NATURAL DISTURBANCES:

CONSERVATION RANK: G4

RANK JUSTIFICATION:

MANAGEMENT COMMENTS: Heavy grazing will cause *Pseudoroegneria spicata* and *Stipa viridula* to decrease. *Pascopyrum smithii, Elymus lanceolatus,* and *Stipa comata* increase initially with heavy grazing, but prolonged heavy grazing will cause these grasses to decrease as well, and will result in an increase in *Artemisia frigida, Gutierrezia sarothrae,* and some forbs. In southwestern Montana stands, *Bouteloua gracilis* does not increase with grazing (Mueggler and Stewart (1980), but this species may respond differently in Great Plains stands. *Chrysothamnus* spp. May increase substantially with disturbance (Tweit and Houston 1980).

DATABASE CODE: CEGL001675

REFERENCES:

Cooper, S.V., P. Lesica, R.L. DeVelice, and J.T. McGarvey. 1995. Classification of southwestern Montana plant communities with emphasis on those of Dillon Resource Area, Bureau of Land Management. Montana Natural Heritage Program, Helena MT. 152 pp.

DeVelice, R. L., S. V. Cooper, J. T. McGarvey, J. Lichthardt and P. S. Bourgeron. 1995. Plant communities of northeastern Montana: A first approximation. Montana Natural Heritage Program, Helena, MT. 113 pp.

Hansen, P.L. and G.R. Hoffman. 1988. The vegetation of the Grand River/Cedar River, Sioux, and Ashland Districts of the Custer National Forest: a habitat type classification. USDA Forest Service General Technical Report RM-157, Rocky Mountain Forest and Range Experiment Station, Fort Collins CO. 68 pp.

Johnston, B.C. 1987. Plant associations of Region Two. Edition 4. USDA Forest Service, Rocky Mountain Region. R2-ECOL-87-2. 429 pp.

Jorgensen, H. E. 1979. Vegetation of the Yellow Water Triangle, Montana. Montana Department of Fish and Game, in cooperation with the Bureau of Land Management. Helena, MT. 57 pp.

Mueggler, W.F. and W.L. Stewart. 1980. Grassland and shrubland habitat types of western Montana. USDA Forest Service General Technical Report INT-66. Intermountain Forest and Range Experiment Station, Ogden UT. 155 pp.

Terwilliger, C., K. Hess, and C. Wasser. 1979. Key to the preliminary habitat types of Region 2. Addendum to initial progress report for habitat type classification. Rocky Mountain Forest and Range Experiment Station, Fort Collins CO.

Tweit, S. and K. Houston. 1980. Grassland and shrubland habitat types of the Shoshone National Forest. USDA Forest Service, Rocky Mountain Region, Shoshone National Forest. 143 pp.

CLASS: HERBACEOUS VEGETATION

FORMATION: MEDIUM-TALL BUNCH TEMPERATE OR SUBPOLAR GRASSLAND (V.A.5.N.D)
ALLIANCE: PSEUDOROEGNERIA SPICATA HERBACEOUS ALLIANCE

PSEUDOROEGNERIA SPICATA - POA SECUNDA HERBACEOUS VEGETATION

COMMON NAME: Bluebunch Wheatgrass-Curly Blue Grass

COLLOQUIAL NAME: Bluebunch Wheatgrass - Sandberg Bluegrass Mixed Grass Prairie

COMMUNITY SUMMARY: Throughout its geographic range this is a bunch grassland with minor cover of forbs and, often, sparse shrubs. *Pseudoroegneria spicata* dominates or co-dominates the vegetation, *Poa secunda* and *Koeleria macrantha* usually are present in substantial amounts, and *Festuca idahoensis* is absent or present in very small amounts. The common shrubs are *Chrysothamnus nauseosus*, *C. viscidiflorus*, and *Artemisia tridentata* (subspecies unknown). Stands of this association occupy loamy, rocky, often shallow soils on slopes and ridges, generally around the edges of basins and in the foothills of the mountains. This association was at one time common throughout its wide geographic range, but much of it in Washington and Oregon has been converted to agricultural fields. In many of the remaining stands, the cover of *P. spicata* has decreased and the cover of *Stipa comata* and shrubs have increased, and exotics (especially *Bromus tectorum*, *Tragopogon* spp., and *Alyssum* spp.) have become common members of the vegetation; these changes are attributed in large part to livestock grazing.

CLASSIFICATION COMMENTS: Relationships between this association and several others are unclear. The *Pseudoroegneria spicata - Balsamorhiza sagittata - Poa secunda* herbaceous vegetation (CEGL001662) from Idaho and Oregon, apparently taken from Tisdale's (1986) *Agropyron spicatum* / *Poa secunda* / *Balsamorhiza sagittata* habitat type of western Idaho, is included here. The *Pseudoroegneria spicata - Poa secunda* (Lithosol) herbaceous vegetation (CEGL001678) of Idaho, Oregon, and Washington may be based on the lithosolic phase of Daubenmire's (1988) habitat type; this association presently includes that vegetation. If these types are to be considered separate associations, clear distinctions must be made between them.

SIMILAR COMMUNITIES: In the *Pseudoroegneria spicata - Pascopyrum smithii* herbaceous association, rhizomatous wheatgrasses (*Pascopyrum smithii* or *Elymus lanceolatus*) are sub-dominant or-co-dominant and clearly contribute more cover than does *Poa secunda*. Similarly, in the *Pseudoroegneria spicata - Stipa comata* association, *S. comata* is sub-dominant or co-dominant and clearly contributes more cover than does *Poa secunda*. The *P. spicata* - Cushion Plant herbaceous vegetation contains a substantial amount of *P. spicata* and often contains *Poa secunda*, but forbs generally provide more cover than do the grasses. The relationship between

this association and the *Pseudoroegneria spicata - Poa fendleriana* Herbaceous association is unclear.

OTHER NAMES: *Agropyron - Poa* grassland zone, climax vegetation (Tisdale 1947)|*Agropyron - Poa* zone, climatic climax (Poulton 1955)|*Agropyron spicatum - Poa secunda* habitat type (Daubenmire 1988)|*Agropyron spicatum* / *Poa sandbergii* / *Balsamorhiza sagittata* habitat type (Tisdale 1986)|*Agropyron spicatum* / *Opuntia polyacantha* habitat type (Tisdale 1986)|*Agropyron spicatum* / *Poa sandbergii* (MONT) habitat type (Mueggler and Stewart 1980)|Upland prairie (Christensen and Welsh 1963)|Central Utah foothill bunchgrass vegetation (Christensen 1963))|*Agropyron spicatum* / *Poa secunda* habitat type (Terwilliger et al. 1979)|*Agropyron spicatum* / *Poa sandbergii* habitat type (Tweit and Houston 1980)|*Agropyron spicatum* / *Poa sandbergii* habitat type (Hess and Wasser 1987.)|Northern Utah Palouse grassland association (Stoddart 1941)|*Roegneria spicata* / *Poa secunda* plant association (Johnston 1987

RELATION TO OTHER NAMES: -|-|-|-|-|-|+|-|-|-|-|-|-

COMMENTS ON OTHER NAMES: ||Daubenmire's (1988) *Pseudoroegneria spicata - Poa secunda* association constitutes relatively undisturbed vegetation on his habitat type. Comments by other authors (Mueggler and Stewart 1980, Tisdale 1986) suggest that it represents relatively xeric and species-poor vegetation of this association.||Tisdale's (1986) *A. spicatum* / *P. sandbergii* / *B. sagittata* habitat type represents a mesic part of this association, with substantial cover of *P. sandbergii* (= *P. secunda*) and of perennial forbs.|Tisdale's (1986) *A. spicatum* / *Opuntia polyacantha* habitat type represents a xeric part of this association, with relatively sparse vegetation in which *P. sandbergii* (= *P. secunda*) contributes little cover and perennial forbs are minor.

ECOREGIONAL DISTRIBUTION:
331A:CC|331F:CC|331G:CP|M331A:CC|M331D:CC|M331H:CP|M331G:CP|M332A:CC|M332B:CP|M332D:CP|M332E:CC|M332G:CC|341A:CC|M341C:CC|342A:CC|342C:CC|342F:CC|342I:CC|

STATE DISTRIBUTION: This association has been described from British Columbia, Washington, Oregon, Idaho, Utah, Colorado, Wyoming, and Montana.

NORTHERN GREAT PLAINS NATIONAL FOREST DISTRIBUTION: This association has been described from the Thunder Basin National Grassland (Terwilliger et al. 1979) and it probably also occurs on the Ashland District of the Custer National Forest.

ENVIRONMENTAL DESCRIPTION: Stands of this association grow on well drained, often shallow, and frequently gravelly or rocky soils generally of loam, silt loam, or sandy loam textural classes. Sites usually are ridges and slopes (and sometimes alluvial fans) of any aspect, although southerly and westerly aspects are most common in the northwestern (British Columbia, Washington, Idaho) and northern (Montana) parts of the geographic range. In Wyoming and Colorado, many of the sites supporting this association are windswept slopes and ridges. This association grows over a very broad elevation range, from 700 - 2,800 feet in the northwestern part of the range, 3,000-7,500 feet in the north-central part, and 9,400-10,000 feet in central Colorado.

VEGETATION DESCRIPTION: As would be expected for an association whose geographic range includes such a broad range of climates and of prehistoric grazing regimes, the composition of the vegetation varies, but a number of traits are constant. Throughout, this is a bunch grassland with minor cover of forbs and, often, sparse shrubs. *Pseudoroegneria spicata* dominates or co-dominates the vegetation, *Poa secunda* and *Koeleria macrantha* usually are present in substantial amounts, and *Festuca idahoensis* is absent or present in very small amounts. *Stipa comata* often is present in substantial amounts and may co-dominate, due (at least in part of the range) to

prolonged grazing. *Bromus tectorum*, *Tragopogon* spp., and *Alyssum* spp. Also are common members of the vegetation, due at least in part to disturbance. The common shrubs are *Chrysothamnus nauseosus*, *C. viscidiflorus*, and *Artemisia tridentata* (subspecies unknown). In southern British Columbia (Tisdale 1947), eastern Washington (Daubenmire 1988), and northeastern Oregon (Poulton 1955, Anderson 1956), the undisturbed vegetation of this type consists of *P. spicata* and *Poa secunda*, with few other vascular plants (*Lomatium macrocarpum*, *Draba verna*, *Artemisia frigida Gutierrezia sarothrae*, and a number of annuals), and substantial cover of epigeous cryptogams. *Stipa comata* is present in most stands and may co-dominate with *P. spicata*, as a result of heavy grazing. In western Idaho (Tisdale 1986), xeric sites support open vegetation with little *Poa secunda* and with *Opuntia polyacantha*, *Phacelia heterophylla*, and *Scutellaria angustifolia*. Stands on mesic sites are denser and usually contain *Balsamorhiza sagittata*, *Lomatium triternatum*, and *Lupinus sericeus*. In Utah (Christensen 1963, Christensen and Welsh 1963), *Gutierrezia sarothrae* is a common but minor species; *Stipa comata* and *Oryzopsis hymenoides* are now common and often contribute substantial cover, apparently in stands disturbed by prolonged grazing. Montana stands (Mueggler and Stewart 1980, Cooper et al. 1995) often contain *Artemisia frigida*, *Gutierrezia sarothrae*, *Achillea millefolium*, *Phlox hoodii*, *Haplopappus acaulis*, and a number of other forbs; *Stipa comata* or *S. spartaea* often co-dominate with *P. spicata*, apparently even in stands that have not been markedly disturbed. In northwestern Wyoming (Tweit and Houston 1980), the vegetation is much like that in Montana (but without *Stipa spartaea*), while in central Wyoming (Williams 1961, Fisser 1964) and northeastern Wyoming (Terwilliger et al. 1979), nearer to the eastern edge of the geographic range, *Bouteloua gracilis*, *Rhus trilobata*, *Pascopyrum smithii*, and *Carex filifolia* may be present as minor species. In Colorado (Hess and Wasser 1987), species present in greater than trace amounts are *Achillea millefolium*, *Arenaria fendleri*, *Oxytropis lambertii*, *Potentilla gracilis*, and *Taraxacum officinale*.

NATURAL DISTURBANCES:

CONSERVATION RANK: G4?

RANK JUSTIFICATION:

MANAGEMENT COMMENTS: Heavy grazing by cattle or horses will cause a decrease in the amount of *Pseudoroegneria spicata* and cryptogamic soil cover, and an increase in *Bromus tectorum*, *Stipa comata*, and shrubs (*Artemisia tridentata*, *Chrysothamnus* spp.). With prolonged heavy grazing, *Poa secunda* and *Stipa comata* will also decrease and the cover of shrubs and grazing-resistant species (especially the exotic bromes) will continue to increase (Tisdale 1947 & 1986, Poulton 1955, Daubenmire 1988, Mueggler and Stewart 1980). The vegetation may then be converted to *Artemisia tridentata* ssp. *wyomingensis*, *Chrysothamnus* spp., *Artemisia frigida*, and *Gutierrezia sarothrae* with little grass cover (Tweit and Houston 1980). *Poa fendleriana* (Tweit and Houston 1980) and *Balsamorhiza sagittata* (Mueggler and Stewart 1980) also increase with grazing. Sheep grazing causes less decline in the amount of *Poa secunda* (Daubenmire 1988), but a decrease in *Balsamorhiza sagittata* (Mueggler and Stewart 1980).

DATABASE CODE: CEGL001677

REFERENCES:

Anderson, W.E. 1956. Some soil-plant relationships in eastern Oregon. Journal of Range Management 9:171-175.

Christensen, E.M. 1963. The foothill bunchgrass vegetation of central Utah. Ecology 44(1): 156-158.

Christensen, E.M. and S.L. Welsh. 1963. Presettlement vegetation of the valleys of western Summit and Wasatch Counties, Utah. Proceedings of the Utah Academy of Science, Arts, and Letters 40: 163-174.

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Poulton, C.E. 1955. Ecology of the non-forested vegetation in Umatilla and Morrow Counties, Oregon. Unpublished dissertation, State College of Washington, Pullman. 166 pp.

Stoddart, L.A. 1941. The Palouse grassland association in northern Utah. Ecology 22:158-163.

Terwilliger,C., K. Hess, and C. Wasser. 1979. Key to the preliminary habitat types of Region 2. Addendum to initial progress report for habitat type classification. Rocky Mountain Forest and Range Experiment Station, Fort Collins CO.

Tisdale, E..W. The grasslands of the southern interior of British Columbia. Ecology 28(4):346-382.

Tisdale, E.W. 1986. Canyon grasslands and associated shrublands of west-central Idaho and adjacent areas. Bulletin No. 40. Forest, Wildlife, and Range Experiment Station, University of Idaho, Moscow. 42 pp.

Tweit, S. and K. Houston. 1980. Grassland and shrubland habitat types of the Shoshone National Forest. USDA Forest Service, Rocky Mountain Region, Shoshone National Forest. 143 pp.

Hess, K. and C.H. Wasser. 1987. Grassland, shrubland, and forestland habitat types of the White River - Arapaho National Forest. Final report. USDA Forest Service Rocky Mountain Region, Lakewood CO.

Williams, C.S. 1961. Distribution of vegetation in the Wind River Canyon, Wyoming. Unpublished thesis, University of Wyoming, Laramie.

FORMATION: Temporarily flooded temperate or subpolar grassland (V.A.5.N.j)

CLASS: HERBACEOUS VEGETATION

FORMATION: INTERMITTENTLY FLOODED TEMPERATE OR SUBPOLAR GRASSLAND (V.A.5.N.I)

ALLIANCE: PASCOPYRUM SMITHII INTERMITTENTLY FLOODED HERBACEOUS ALLIANCE

PASCOPYRUM SMITHII - BUCHLOE DACTYLOIDES - (PHYLA CUNEIFOLIA - OENOTHERA CANESCENS) HERBACEOUS VEGETATION

COMMON NAME: Western Wheatgrass - Buffalo Grass - (Wedgeleaf Frogfruit - Spotted Evening-primrose) Herbaceous Vegetation

COLLOQUIAL NAME: WHEATGRASS PLAYA LAKE GRASSLAND

COMMUNITY SUMMARY: This association represents the common vegetation type of seasonally-flooded playa lake basins (depressional wetlands) under rangeland conditions in the southern and central Great Plains of the United States. Perennial herbaceous graminoids and forbs < 1 m tall dominate the community. The composition of the vegetation varies between stands with latitude and within a stand depending on water level, but *Pascopyrum smithii* is consistently the most abundant species throughout the range of the association.

Perennial herbaceous graminoids and forbs < 1 m tall dominate the community, with composition varying depending on water levels.

CLASSIFICATION COMMENTS:

SIMILAR COMMUNITIES: The *Pascopyrum smithii - Eleocharis* spp. Herbaceous vegetation association grows in playas in the northern U.S. Great Plains, in northeastern Wyoming and (probably) southeastern Montana. Stands of that association apparently have fewer species, and are characterized by dominance of *Pascopyrum smithii* and *Eleocharis acicularis* or *E. palustris* (syn. *E. machrostachya*).

OTHER NAMES: Playa meadow (Steinauer and Rolfsmeier 1997), playa grassland, grass playa lake

RELATION TO OTHER NAMES:

COMMENTS ON OTHER NAMES:

ECOREGIONAL DISTRIBUTION: 331B:CP|331C:CP|331F:CC|332E:CP|311A:PP|351B:PP

STATE DISTRIBUTION: This association has been described from Nebraska and Kansas, and probably also occur in Texas and Oklahoma.

NORTHERN GREAT PLAINS NATIONAL FOREST DISTRIBUTION: Small stands of this association occur on the Oglala National Grassland (G. Steinauer, pers. comm.).

ENVIRONMENTAL DESCRIPTION: Stands of this association grow in shallow depressions (playas) with fine-textured soils (usually silty clay loams with a clay pan) that impede drainage. The soils are usually developed in loess. In the central Great Plains, the playas generally flood in winter and spring and are dry by mid-summer. In the southern plains, the patter of inundation is generally the same, but inundation there is unpredictable and depends on highlylocalized rains.

VEGETATION DESCRIPTION: Plant species diversity is low to moderate in stands of this association. *Pascopyrum smithii* is generally the most abundant species throughout the range of this type. In the central Great Plains, *Agrostis hyemalis, Eleocharis palustris, Eleocharis macrostachya*, *Elymus virginicus*, and *Hordeum jubatum* are locally abundant. *Buchloe dactyloides* can be abundant in grazed sites. Early-season ephemeral annuals include *Alopecurus carolinianus, Elatine rubella, Myosurus minimus, Veronica peregrina* ssp. *xalapensis* and, in the western part of the geographic range, *Limosella aquatica* and *Plagiobothrys scouleri*. Perennial

forbs are conspicuous in places, including *Ambrosia grayi*, *Phyla cuneifolia*, *Oenothera canescens*, *Rorippa sinuata*, and *Vernonia fasciculata*. In the southern Great Plains, species characteristic of the type include *Buchloe dactyloides*, *Distichlis spicata*, and *Panicum obtusum*.

NATURAL DISTURBANCES:

CONSERVATION RANK: G2G3

RANK JUSTIFICATION:

MANAGEMENT COMMENTS:

DATABASE CODE: CEGL002038

REFERENCES:

Lauver, C. In prep. Kansas Vegetation Classification. Southwestern Naturalist.

Steinauer, G. and S. Rolfsmeier. 1997. Terrestrial natural communities of Nebraska. Nebraska Game and Parks Commission, Lincoln NE. October 28, 1997 draft. 117 pp.

Weakley, A.S., K.D. Patterson, S. Landaal, M. Pyne, and others (compilers). 1998. International classification of ecological communities: terrestrial vegetation of the southeastern United States. Working draft as of March, 1998. The Nature Conservancy, Southeast Regional Office, Southern Conservation Science Department, Community Ecology Group. Chapel Hill NC.

CLASS: HERBACEOUS VEGETATION

FORMATION: TEMPORARILY FLOODED TEMPERATE OR SUBPOLAR GRASSLAND (V.A.5.N.J)
ALLIANCE: PASCOPYRUM SMITHII TEMPORARILY FLOODED HERBACEOUS ALLIANCE

PASCOPYRUM SMITHII - DISTICHLIS SPICATA HERBACEOUS VEGETATION

COMMON NAME: Western-wheat Grass - Coastal Saltgrass Herbaceous Vegetation

COLLOQUIAL NAME: Western Wheatgrass - Inland Saltgrass Mixedgrass Prairie

COMMUNITY SUMMARY: *Pascopyrum smithii - Distichlis spicata* Herbaceous Vegetation is found in Wyoming, Nebraska, and North Dakota in depressions and on stream terraces on deep, moderately saline soils, sometimes with a clay subsoil. These soils are wet for part of the year and may flood periodically. This community is dominated by graminoids, the tallest of which may rarely reach 1 m in Nebraska. Most of the vegetation is 0.6 m or less. The dominants are

Pascopyrum smithii and *Distichlis spicata*. Woody plants are minor species, but *Artemisia tridentata* ssp. *wyomingensis*, *Artemisia cana* ssp. *cana*, *Salix exigua*, and *Populus deltoides* are present in some stands. In Nebraska an "alkaline intermittent stream bottom" type dominated by *Distichis spicata*, *Pascopyrum smithii*, *Poa glaucifolia*, and *Poa juncifolia* is also included in this type.

CLASSIFICATION COMMENTS:

SIMILAR COMMUNITIES: The *Distichlis stricta* herbaceous vegetation association apparently differs from this association in having *D. stricta* as a strong dominant and little cover of *Pascopyrum smithii*, but the minimum amount of *P. smithii* needed to place a stand into this association is unclear. The *Sporobolus airoides - Distichlis stricta* herbaceous vegetation apparently differs from this association in having little *Pascopyrum smithii*, and *S. airoides* and *D. stricta* as the dominant species.

OTHER NAMES: Saltgrass-western wheatgrass type (Hanson and Whitman 1938)|Lowland prairie type (Keammerer 1987)|Western floodplain meadow (Steinauer and Rolfsmeier (1997)|Alkaline intermittent stream bottom (Steinauer and Rolfsmeier 1997)|*Elytrigia smithii - Distichlis spicata* plant association (Johnston 1987)|*Agropyron smithii* habitat type (Hansen et al. 1995)|*Distichlis spicata* habitat type (Hansen et al. 1995)

RELATION TO OTHER NAMES: =|+|+|-|=|?|?

COMMENTS ON OTHER NAMES: Hanson and Whitman (1938) describe this type from western North Dakota.|Keammerer's (1987) type in northeastern Wyoming may include stands of *Distichlis spicata - Sporobolus airoides* vegetation.|The western floodplain meadow of Nebraska (Steinauer and Rolfsmeier 1997) is a broader type that includes vegetation with little *Distichlis*.|The alkaline intermittent stream bottom (Steinauer and Rolfsmeier 1987) apparently includes stands of this association and stands on highly saline sites dominated by other grasses |Johnston's (1987) type is taken from Hanson and Whitman (1938) and is the same as this association.

ECOREGIONAL DISTRIBUTION: 331F:CC|331G:CC|331H:CC

STATE DISTRIBUTION: This association has been described from northeastern Wyoming (Keammerer 1987, Harner-White, no date; NVS Corporation, no date; Stoecker-Keammerer (a), no date, Stoecker-Keammerer (c), no date; Western Resources (a), no date; Western Resources (c), no date), western Nebraska (Steinauer and Rolfsmeier 1997), and western North Dakota (Hanson and Whitman 1938). It probably also occurs in eastern Montana (S. Cooper, Montana Natural Heritage Program, pers. comm., 12/98) but apparently it has not been documented there.

NORTHERN GREAT PLAINS NATIONAL FOREST DISTRIBUTION: This association occurs on the Thunder Basin National Grassland and the Oglala National Grassland. It may also be found on the Buffalo Gap and Little Missouri National Grasslands and the Sioux and Cedar River Districts of the Custer National Forest.

ENVIRONMENTAL DESCRIPTION: Stands of this association grow in draws and valley bottoms with deep soils of loam, silt loam, sandy loam, clay loam, and clay texture. The soils often are poorly drained and have moderately high salt content.

VEGETATION DESCRIPTION: *Pascopyrum smithii* generally dominates the vegetation, and *Distichlis spicata* is a secondary species, although the two grasses may co-dominate the vegetation. Other species that often are present are *Bouteloua gracilis*, *Poa pratensis*, *Hordeum jubatum*, *Spartina gracilis*, *Stipa comata*, *Nassella viridula*, *Artemisia frigida*, *Artemisia ludoviciana*, *Aster falcatus*, and *Taraxacum officinale*. These species usually are minor parts of the vegetation, but in some stands one or more of them may contribute substantial cover. In

Nebraska, alkaline indicators may be present, including *Muhlenbergia asperifolia* and *Sporobolus airoides*. Scattered *Artemisia tridentata* ssp. *wyomingensis* and *Artemisia cana* ssp. *cana* are present in some Wyoming stands, and in Nebraska the vegetation may include scattered *Populus deltoides* or *Salix exigua*. Exotic species, principally cheatgrasses (*Bromus* spp.), Kentucky bluegrass (*Poa pratensis*), and Canada thistle (*Cirsium arvense*), are ubiquitous in this association and contribute substantial cover in many stands.

NATURAL DISTURBANCES: Stands of this type are subject to flooding and deposition of sediment (Hanson and Whitman 1938).

CONSERVATION RANK: G4

RANK JUSTIFICATION: The G4 rank is based on a large geographic range and rather general environmental requirements. In light of the ubiquity of exotic plants in this type and the large proportion of stands in Nebraska (and perhaps elsewhere) that have been heavily disturbed by livestock (Steinauer and Rolfsmeier), the rank probably should be reviewed.

MANAGEMENT COMMENTS:

DATABASE CODE: CEGL001580

REFERENCES:

Hanson, H.C. and W. Whitman. 1938. Characteristics of major grassland types in western North Dakota. Ecological monographs 8(1): 57-114.

Harner-White Consultants. No date. Dry Fork Mine application. No. 599-T1, on file at Wyoming Department of Environmental Quality, Land Quality Division, Cheyenne WY.

Johnston, B.C. 1987. Plant associations of Region Two. Edition 4. USDA Forest Service, Rocky Mountain Region. R2-ECOL-87-2. 429 pp.

Keammerer, W. 1987. Bentonite regional vegetation study. Report prepared for Crook County Bentonite Producers and Wyoming Department of Environmental Quality, Land Quality Division by Stoecker-Keammerer & Associates Environmental Consultants, Boulder CO. iii + 131 pp.

Steinauer, G. and S. Rolfsmeier. 1997. Terrestrial natural communities of Nebraska. Nebraska Game and Parks Commission, Lincoln NE. 117 pp.

Stoecker-Keammerer Consultants. No date (a). Black Thunder Mine application no. 233-T3, on file at Wyoming Department of Environmental Quality, Land Quality Division, Cheyenne WY.

Stoecker-Keammerer Consultants. No date ©. North Rochelle Mine application no. 550-T2, on file at Wyoming Department of Environmental Quality, Land Quality Division, Cheyenne WY.

Western Resources Development Corporation. No date (a). Caballo Mine application no. 433-T2, on file at Wyoming Department of Environmental Quality, Land Quality Division, Cheyenne WY.

Western Resources Development Corporation. No date ©. Rawhide Mine application no. 240-T1, on file at Wyoming Department of Environmental Quality, Land Quality Division, Cheyenne WY.

CLASS: HERBACEOUS VEGETATION

FORMATION: TEMPORARILY FLOODED TEMPERATE OR SUBPOLAR GRASSLAND (V.A.5.N.J)

ALLIANCE: PASCOPYRUM SMITHII TEMPORARILY FLOODED HERBACEOUS ALLIANCE

PASCOPYRUM SMITHII - ELEOCHARIS SPP. HERBACEOUS VEGETATION

COMMON NAME: Western Wheatgrass - Eleocharis spp. Herbaceous Vegetation

COLLOQUIAL NAME: Western Wheatgrass - Spikerush Mixedgrass Prairie

COMMUNITY SUMMARY: This association includes stands of herbaceous vegetation growing in periodically-inundated, closed basins of < 1 ha on the Northern Great Plains. The matrix vegetation surrounding these playas usually is *Pascopyrum smithii - Bouteloua gracilis - Carex filifolia* herbaceous vegetation or *Artemisia tridentata* ssp. *wyomingensis* shrub-herbaceous vegetation. The vegetation in stands of this association typically has two zones, with *Eleocharis* spp. (*E. acicularis* or *E. plasters*) dominating the inner, lower part of the stand, and *Pascopyrum smithii* dominating the outer, higher part. Most of the species common in the surrounding vegetation are absent from stands of this type, or contribute little cover.

CLASSIFICATION COMMENTS: Stand data from this association and from the *Pascopyrum smithii - Buchloe dactyloides* - (*Phyla cuneifolia - Oenothera canescens*) association should be reviewed to determine whether this association is best considered a phase of the latter association.

SIMILAR COMMUNITIES: Stands of the *Pascopyrum smithii - Hordeum jubatum* Herbaceous Vegetation Association are dominated or co-dominated by *P. smithii*, but *Eleocharis* spp. are absent and *Hordeum jubatum* is a major species. Stands of that association occur in playas where subsoil's contain higher concentrations of sodium (Paris and Paris 1974, Bergman and Marcus 1976). The *Pascopyrum smithii - Buchloe dactyloides* - (*Phyla cuneifolia - Oenothera canescens*) Herbaceous Vegetation Association apparently is a central and southern Great Plains version of this association. It occupies the same kind of playa habitats and contains species in common with this association, but it typically contains more species, many of which do not occur in this *P. smithii - Eleocharis* spp. Association. Holly (1977) described vegetation from 10 playas in Campbell County, Wyoming (within the geographic area that this association occupies) that seem very similar to the playas containing this association. His stands generally were dominated by *Pascopyrum smithii* and contained some wetland species (*Juncus balticus, Alopecurus carolinianus*), but they showed no consistency in species composition and none contained *Eleocharis* spp.

OTHER NAMES: Clayey overflow range site (USDA Soil Conservation Service 1988)|*Agropyron smithii* / *Carex filifolia* habitat type (Hansen and Hoffman 1988)|*Agropyron smithii* sodgrass steppe (Thilenius et al. 1995)|*Agropyron smithii - Eleocharis acicularis* vegetation type (Paris and Paris 1974, Bergman and Marcus 1976)|Playa grassland (Smith, no date).|Playa grassland (USDI Bureau of Land Management 1974)|*Elytrigia smithii* / *Eleocharis acicularis* plant association (Johnston 1987)

RELATION TO OTHER NAMES: +|+|=|=|+|=

COMMENTS ON OTHER NAMES: Stands of this association occur on the clayey overflow range site.|Two stands on Hansen's and Hoffman's (1988) habitat type (Table A-5, stands 61 and 136) contain substantial amounts of *Eleocharis acicularis* and apparently belong to this association . Two more of their stands (Table A-5, stands 3 and 81) contain no *Eleocharis* sp. But do contain substantial amounts of *Alopecurus carolinianus* and may also belong to this association.|Thilenius et al. (1995) apparently include this vegetation in their *Agropyron smithii* sodgrass steppe as a type growing in stock ponds.|The stands in Paris and Paris (1974, Table E-6,

pp. IX-E-18 & 19) included *Carex eleocharis*.|Smith's (no date) playa grassland type is drawn from vegetation descriptions in 12 mine permit applications and is a basic reference for this association.|The BLM's playa grassland in northeastern Wyoming (USDI Bureau of Land Management 1974) includes this association.|Johnston's (1987) plant association is the same as this association.

ECOREGIONAL DISTRIBUTION: 331G:CC| 331F:CP

STATE DISTRIBUTION: This association is known from Wyoming and probably occurs in south-eastern Montana (Hansen and Hoffman 1988, Table A-5, stands 61 and 136).

NORTHERN GREAT PLAINS NATIONAL FOREST DISTRIBUTION: This association may occur on the Thunder Basin National Grassland and on the Sioux District of the Custer National Forest.

ENVIRONMENTAL DESCRIPTION: Stands of this association occupy periodically-inundated, closed basins (playas) of < 2.5 acres (1 ha) underlain by fine-textured soils, usually with a clay pan in the subsoil. These playas apparently have standing water and high water tables longer than do playas supporting the similar *P. smithii - Hordeum jubatum* association (USDI Bureau of Land Management 1974), and the soils are lower in sodium than are soils supporting that association (Paris and Paris 1974, Bergman and Marcus 1976).

VEGETATION DESCRIPTION: This type includes low, herbaceous vegetation growing in closed basins. *Pascopyrum smithii* and *Eleocharis acicularis* (in some stands, *E. palustris*, syn. *E. machrostachya*) generally dominate, and the plants common in the surrounding steppe generally are absent or contribute very little cover. Stands of this type typically include two zones, resulting from differences in the period of inundation. Jones (1997) indicated the lowest part of a particular stand, which is inundated most often and for the longest time, is dominated by *Eleocharis acicularis*, and may contain *Hordeum brachyantherum*, *Juncus balticus*, and *Alopecurus aequalis* or *A. carolinianus*, and bare soil accounts for ca. 75% of the ground surface. The higher part of the stand was dominated by *Pascopyrum smithii* and may contain substantial amounts of *Carex douglasii* and *Festuca octoflora*. According to Thilenius et al. (1995), *Hordeum jubatum* occurs on the margins of the stands. Hansen and Hoffman (1988) apparently include two stands of this association in their *Agropyron smithii* / *Carex filifolia* habitat type (Table A-5, pp. 42-43, stands 61 and 136) that contain only *Pascopyrum smithii*, *Eleocharis acicularis*, and *Hordeum jubatum*. The stands in Paris and Paris (1974, Table E-6, pp. IX-E-18 & 19) included *Carex eleocharis*.

NATURAL DISTURBANCES:

CONSERVATION RANK: G1

RANK JUSTIFICATION: A suggestion has been made in an updated element global rank form (TNC Western Conservation Science 1998) to change the conservation rank from G2G3 to G1 to reflect the very limited known distribution of this association, the small number of stands, and the small proportion of stands that are undisturbed.

MANAGEMENT COMMENTS:

DATABASE CODE: CEGL001581

REFERENCES:

Bergman, H. L. and M. D. Marcus (eds). Final environmental assessment, Black Thunder Mine Site, Campbell County, Wyoming. Volume II (Text) and Volume III (Appendix). University of Wyoming Black Thunder Research Team.

Hansen, P. L. and G. R. Hoffman. 1988. The vegetation of the Grand River/Cedar River, Sioux, and Ashland Districts of the Custer National Forest: a habitat type publication. USDA Forest Service General Technical Report RM-157. Rocky Mountain Forest and Range Experiment Station, Fort Collins CO. 68 pp.

Holpp, F. A. 1977. Vegetative composition and soil analysis of selected playas of Campbell County, Wyoming. M.S. Thesis, Range Management Section, University of Wyoming. Laramie WY.

Johnston, B.C. 1987. Plant associations of Region Two. Edition 4. USDA Forest Service, Rocky Mountain Region. R2-ECOL-87-2. 429 pp.

Jones, G. P. 1997. Ecological evaluation of the potential Playas Research Natural Area within the Thunder Basin National Grassland, Campbell County, Wyoming. Unpublished report prepared for the Nebraska National Forest, USDA Forest Service by the Wyoming Natural Diversity Database.

Paris, O. and M. J. W. Paris (eds.). 1974. Initial composite report on the environmental impact assessment of the proposed Black Thunder Mine. Volume 1. Unpublished report submitted to the Wyoming Environmental Institute by the University of Wyoming Black Thunder Project Research Team.

Smith, Jack. No date. Comprehensive vegetation data base for surface mining in Wyoming. Wyoming Department of Environmental Quality, Land Quality Division, Cheyenne WY. 27 pp.

Thilenius, J. F., G. R. Brown, and A. L. Medina. 1995. Vegetation on semi-arid rangelands, Cheyenne River Basin, Wyoming. USDA Forest Service General Technical Report RM-GTR-263. Rocky Mountain Forest and Range Experiment Station, Fort Collins CO. 60 pp.

USDA Soil Conservation Service, 1988. Technical guide to range sites, section II. Wyoming State Office, Casper WY.

USDI Bureau of Land Management. 1974. Final environmental impact statement, eastern Powder River coal basin of Wyoming.

CLASS: HERBACEOUS VEGETATION

FORMATION: TEMPORARILY FLOODED TEMPERATE OR SUBPOLAR GRASSLAND (V.A.5.N.J)
ALLIANCE: PASCOPYRUM SMITHII TEMPORARILY FLOODED HERBACEOUS ALLIANCE

PASCOPYRUM SMITHII - HORDEUM JUBATUM HERBACEOUS VEGETATION

COMMON NAME: Western-Wheat Grass - Foxtail Barley Herbaceous Vegetation

COLLOQUIAL NAME: Western Wheatgrass - Foxtail Barley Mixedgrass Prairie

COMMUNITY SUMMARY: This herbaceous vegetation type occurs as small patches in temporarily flooded sites, surrounded by grasslands or shrublands. *Pascopyrum smithii* (or

Elymus lanceolatus) and *Hordeum jubatum* are the major species, and other species from the surrounding matrix vegetation may be present.

CLASSIFICATION COMMENTS: This association has not been described well. Further analysis of existing information and additional inventory will be helpful in determining the range of variation in stands of this type and how this type differs from other vegetation types of temporarily flooded sites.

SIMILAR COMMUNITIES: Baker (1984) has named a *Hordeum jubatum* plains grassland from Colorado, but the relationship between this association and that type remains to be determined. Stands of the *Pascopyrum smithii - Eleocharis* spp. association are dominated or co-dominated by *P. smithii* and often contain *Hordeum jubatum* as a minor species. However, *Eleocharis* spp. dominate or co-dominate in that association, and stands of that association occur on sites where subsoils contain lower concentrations of sodium (Paris and Paris 1974, Bergman and Marcus 1976) and where water stands longer (USDI Bureau of Land Management 1974).

OTHER NAMES: Playa meadow (Steinauer and Rolfsmeier 1997)|*Agropyron smithii* sodgrass steppe (Thilenius et al. 1995)|Playa grassland (USDI Bureau of Land Management 1974)

RELATION TO OTHER NAMES: +|+|+

COMMENTS ON OTHER NAMES: |Thilenius et al. (1995) suggest that vegetation of this association forms bands around stock ponds in their *Agropyron smithii* sodgrass steppe.|The playa grassland type of northeastern Wyoming (USDI Bureau of Land Management 1974) includes this association.

ECOREGIONAL DISTRIBUTION: 331F:CC|331G:CC|342F:CC

STATE DISTRIBUTION: Stands of this association have been described from the Hanna Basin of south-central Wyoming (Medicine Bow Mine, no date), the Powder River Basin of northeastern Wyoming (USDI Bureau of Land Management 1974, Paris and Paris 1974, Bergman and Marcus 1976, Thilenius et al. 1995), eastern Montana (S. Cooper, Montana Natural Heritage Program, pers. comm., 12/98), apparently from playa meadows in Nebraska (Steinauer and Rolfsmeier 1997), and from eastern Colorado (Colorado Natural Heritage Program, unpublished data). It probably also occurs on the Great Plains of Alberta, Saskatchewan, North Dakota, South Dakota, and Kansas.

NORTHERN GREAT PLAINS NATIONAL FOREST DISTRIBUTION: This association occurs on the Thunder Basin National Grassland, and it probably can be found on the Sioux and Grand River Districts of the Custer National Forest, and the Little Missouri, Buffalo Gap, and Oglala National Grasslands.

ENVIRONMENTAL DESCRIPTION: Stands of this association occupy temporarily-flooded sites (playas and stock ponds) with deep, poorly drained, clayey, alkaline-saline soils. They apparently occupy soils with higher sodium concentrations than do stands of the similar *Pascopyrum smithii -Eleocharis* spp. Association (Bergman and Marcus 1976), or playas where surface dries and the water table drops more quickly (USDI Bureau of Land Management 1974). This type occurs on draw-down zones around reservoirs in eastern Montana (S. Cooper, Montana Natural Heritage Program, pers. comm., 12/98).

VEGETATION DESCRIPTION: Grasses contribute most of the cover in this association, although forbs and scattered shrubs may be present. *Pascopyrum smithii* or *Elymus lanceolatus* dominate, and *Hordeum jubatum* contributes substantial cover. Other species may be present but contribute little cover. Stands in south-central Wyoming contain scattered *Atriplex gardneri* from the surrounding vegetation (Medicine Bow Mine, no date).

NATURAL DISTURBANCES:

CONSERVATION RANK: G4

RANK JUSTIFICATION: The G4 rank is based on a assumed broad geographic range.

MANAGEMENT COMMENTS:

DATABASE CODE: CEGL001582

REFERENCES:

Baker, W.L. 1984. A preliminary classification of the natural vegetation of Colorado. Great Basin Naturalist 44(4): 647-676.

Bergman, H. L. and M. D. Marcus (eds). Final environmental assessment, Black Thunder Mine Site, Campbell County, Wyoming. Volume II (Text) and Volume III (Appendix). University of Wyoming Black Thunder Research Team.

Medicine Bow Mine. No date. Application no. 331-T1 on file at Wyoming Department of Environmental Quality, Land Quality Division, Cheyenne WY.

Paris, O. and M. J. W. Paris (eds.). 1974. Initial composite report on the environmental impact assessment of the proposed Black Thunder Mine. Volume 1. Unpublished report submitted to the Wyoming Environmental Institute by the University of Wyoming Black Thunder Project Research Team.

Thilenius, J. F., G. R. Brown, and A. L. Medina. 1995. Vegetation on semi-arid rangelands, Cheyenne River Basin, Wyoming. USDA Forest Service General Technical Report RM-GTR-263. Rocky Mountain Forest and Range Experiment Station, Fort Collins CO. 60 pp.

USDI Bureau of Land Management. 1974. Final environmental impact statement, eastern Powder River coal basin of Wyoming.

APPENDIX I - ARCHIVED DESCRIPTIONS

CLASS: SHRUBLAND

FORMATION: MICROPHYLLOUS EVERGREEN SHRUBLAND (III.A.4.N.A)
ALLIANCE: ARTEMISIA TRIDENTATA SHRUBLAND ALLIANCE

ARTEMISIA TRIDENTATA / ELYMUS LANCEOLATUS SHRUBLAND

COMMON NAME: Big Sagebrush / Streamside Wildrye

COLLOQUIAL NAME: Big Sagebrush /Thick-spike

COMMUNITY SUMMARY: A community type synopsis has little merit when the dominant species level taxon, *A. tridentata*, is very broadly distributed, but the subspecies occupy relatively distinct ecological spaces, landscape positions and geographic areas. The specification of *A. tridentata / E. lanceolatus* denotes an entity somewhere between the association and alliance floristic levels (see CLASSIFICATION COMMENTS).

CLASSIFICATION COMMENTS: **ARCHIVED:** This syntaxa, as now defined, potentially constitutes a combination of vegetation types recognized by the following dominant shrub taxa, *A tridentata* ssp. *tridentata, A. tridentata* ssp. *wyomingensis, A. tridentata* ssp. *vaseyana*; each subspecies deserves to be recognized, whenever possible, at the association level.

The *A. tridentata / E. lanceolatus* "association" is actually plagued with classification problems of both the dominant shrub component and the diagnostic graminoid(s). When first defined by Jorgensen (1979) for the Yellow Water Triangle of the Northwestern Glaciated Plains Section (331D), he stipulated the full habitat type name (approximately equal to plant association) to include two phase designations, *Agropyron spicatum* (syn. *Pseudoroegneria spicata*) and *Sarcobatus vermiculatus*. Jorgensen (1979) cites personal correspondence from R. Daubenmire, that a floristic variant of the *A. tridentata / E. lanceolatus* vegetation type is present in southern Idaho, as the reason for his (Jorgensen's) designation of phase so that his types would not be confused with those of southern Idaho. However, descriptions of *A. tridentata / E. lanceolatus* (or even *A. tridentata / Pascopyrum smithii*) from southern Idaho have never been published; even in the authoritative treatment of southern Idaho steppe communities (Hironaka et al. 1983) neither of these grass species is even mentioned, much less as a dominant or diagnostic species. Jorgensen (1979) did not recognize a particular subspecies of *A. tridentata*, but almost certainly he was dealing with ssp. *wyomingensis*. It should be noted that Jorgensen (1979) defined this type by the dominance of either *Elymus lanceolatus* or *Pascopyrum smithii* or both.

In southeastern Montana a syntaxon similar in both floristics and environment (Cretaceous shale-derived soils with heavy textures and appreciable soluble salts) to that described by Jorgensen (1979) has been characterized and named *Artemisia tridentata* ssp. *wyomingensis / Pascopyrum smithii (Elymus lanceolatus)* (Vanderhorst et al. 1998). Vanderhorst et al. (1998) note that within a single drainage of southern Carter County, MT several overlapping vegetation studies have registered varying and contradictory observations concerning big sagebrush-dominated plots; 1) both *E. lanceolatus* and *P. smithii* are present as dominant graminoids, 2) only *P. smithii* is present in the landscape, and 3) within a given plot one or the other graminoid is present and dominant, but not both. Quite obviously field biologists are having difficulty

identifying/separating these two taxa; they clearly have overlapping ecological and geographic distributions. For the western Canadian prairie at least, Coupland (1950) characterized these two grasses as having relatively distinct ecologies and occurring in characteristic landscape positions and he indicated the importance of *E. lanceolatus* diminished significantly to the south (within the US). Within Montana these distinctions are not at all clear-cut, resulting in their being considered ecological equivalents (Vanderhorst et al. 1998). Merging this type (or the stands/plots thereof) with a *Artemisia tridentata* ssp. *wyomingensis / Pascopyrum smithii* Shrub Herbaceous Association would seem to in line with ecological reality and satisfy the demands of syntaxonomy as well.

SIMILAR COMMUNITIES: *Artemisia tridentata* ssp. *wyomingensis / Pascopyrum smithii* Shrub is defined by the dominance of *P. smithii* and *Elymus lanceolatus* is not recognized as an ecological equivalent; the same holds true for *Artemisia tridentata* ssp. *tridentata / Pascopyrum smithii* Shrub with the exception that the dominant shrub is the *tridentata* subspecies. Both the above-cited types are shrublands (>25% shrub cover) which is not true for the type being described; a more similar type would be *Artemisia tridentata* / *Pascopyrum smithii* Shrub Herbaceous.

OTHER NAMES: *Artemisia tridentata* ssp. *wyomingensis / Pascopyrum smithii (Elymus lanceolatus*) (Vanderhorst et al. 1997)| *Artemisia tridentata / Agropyron dasystachyum* (syn. *Elymus lanceolatus*) habitat type (Jorgensen 1979)| *Artemisia tridentata* ssp. *wyomingensis / Agropyrum smithii* (syn. *Pascopyrum smithii*) habitat type (Jensen et al. 1992)| *Artemisia tridentata / Agropyron smithii* habitat type (Hansen and Hoffman 1988)

RELATION TO OTHER NAMES: -|=|+|-

COMMENTS ON OTHER NAMES:

ECOREGIONAL DISTRIBUTION: Province 331, Sections D:CC| E:C?| F:CC| G:CC (Nesser et al. 1997)

STATE DISTRIBUTION: This association has been documented from the Montana plains, glaciated and not and can be expected to barely penetrate to southern Alberta, western North Dakota and South Dakota, and northeastern Wyoming;

NORTHERN GREAT PLAINS NATIONAL FOREST DISTRIBUTION: Custer National

ENVIRONMENTAL DESCRIPTION: This syntaxa occurs on deep, heavy-textured and high in soluble salts soils developed primarily from Cretaceous shales. By far the major portion of the landscape over which this type occurs consists of gently rolling glaciated and non-glaciated surfaces, however, no aspect or slope steepness limits have been noted or conjectured.

VEGETATION DESCRIPTION: As described from Montana's eastern prairies, a sparse shrub layer (10%> canopy cover <25 (30)%, average 15%) is dominated by *Artemisia tridentata* ssp. *wyomingensis*. The subshrubs *Artemisia frigida* and *Gutierrezia sarothrae* are consistently present with low cover values, except where grazing has been intensive. Jorgensen's (1979) concept of the type includes *Sarcobatus vermiculatus* with more than trace amounts of cover on salt-affected sites. The undergrowth is usually dominated by *Elymus lanceolatus* and/or *Pascopyrum smithii*, however local expressions, such as west-central MT, have *Pseudoroegneria spicata*, or even *Koeleria macrantha* dominant. Forbs of high constancy, regardless of regional setting, include *Sphaeralcea coccinea* and *Vicia americana*.

NATURAL DISTURBANCES:

CONSERVATION RANK: G3?

RANK JUSTIFICATION:

MANAGEMENT COMMENTS:

DATABASE CODE: CEGL000992

REFERENCES:

Coupland, R. T. 1950. Ecology of mixed prairie in Canada. Ecological Monographs 20(4): 271-315.

Hansen, P.L. and G.R. Hoffman. 1988. The vegetation of the Grand River/Cedar River, Sioux, and Ashland Districts of the Custer National Forest: a habitat type classification. USDA Forest Service General Technical Report RM-157, Rocky Mountain Forest and Range Experiment Station, Fort Collins, CO. 68 pp.

Hironaka, M., M. A. Fosberg and A. H. Winward. 1983. Sagebrush-grass habitat types of southern Idaho. Forestry, Wildlife, and Range Experiment Station Bulletin No. 15, University of Idaho, Moscow. 44 pp.

Jensen, M., F. Heisner, J. DiBenedetto, L. Wessman and G. Phillips. 1992. Ecological sites and habitat types of the Little Missouri National Grassland and western North Dakota (Draft II). Custer National Forest, Billings, MT and Northern Region, USDA Forest Service, Missouala, MT. Not paginated.

Jorgensen, H. E. 1979. Vegetation of the Yellow Water Triangle, Montana. Montana Department of Fish and Game, in cooperation with the Bureau of Land Management. Helena, MT. 57 pp.

McNab, W. H. and P. E. Avers, comps. 1994. Ecological subregions of the United States: Section descriptions. Administrative Publication WO-WSA-5. Washington, DC: U. S. Department of Agriculture, Forest Service. 267 pp.

Nesser, J. A., G. L. Ford, C. L. Maynard, & D. S. Page-Dumroese. 1997. Ecological units of the Northern Region: Subsections. USDA For. Serv. Gen. Tech. Rept.INT-GTR-369. Intermountain Research Station, Ogden, UT. 88 pp.

Vanderhorst, J. , S. V. Cooper and B. L. Heidel. 1998. Botanical and vegetation survey of Carter County, Montana. Unpublished report to Bureau of Land Management. Montana Natural Heritage Program, Helena. 116 pp. + app

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CLASS: SHRUBLAND

FORMATION: MICROPHYLLOUS EVERGREEN SHRUBLAND (III.A.4.N.A)
ALLIANCE: ARTEMISIA TRIDENTATA SSP. VASEYANA SHRUBLAND ALLIANCE

ARTEMISIA TRIDENTATA SSP. VASEYANA / PSEUDOROEGNERIA SPICATA SHRUBLAND

COMMON NAME: Mountain Big Sagebrush/Bluebunch Wheatgrass

COLLOQUIAL NAME:

COMMUNITY SUMMARY: This is a common Montain Big Sagebrush shrub vegetation type of the foothills and lower slopes of mountain ranges from the eastern side of the Rocky Mountains to western Idaho and northeastern Nevada on the west, and at least from southern Montana on the north to central Colorado on the south. Stands of this association generally grow on the warmest and driest sites that support *A. tridentata* ssp. *vaseyana* vegetation types.

Landscape positions are mainly south- or west-facing slopes, although some stands occur on nearly flat ridge tops. Soils generally are moderately deep to deep, well drained, and of loam, sandy loam, clay loam, or gravelly loam textural classes; often have a substantial volume of coarse fragments, and are derived from a variety of parent materials (although sandstones, limestones, and crystalline rocks predominate). Elevations range from 5,000-6,000 feet in southwestern Montana, 6,500-9,000 feet in Wyoming, 7,000-8,500 feet in northwestern Colorado, and 6,000-10,000 feet in northeastern Nevada.

Artemisia tridentata ssp. *vaseyana* dominates a shrub layer that often is dense and includes a considerable amount of *Purshia tridentata* and smaller amounts of other shrubs, such as *Chrysothamnus nauseosus*, *C. viscidiflorus*, *Symphoricarpos oreophilus*, *Ribes cereum*, and *Rosa woodsii*. The undergrowth generally is moderately dense to dense; grasses contribute more cover than do forbs. *Pseudoroegneria spicata* is the dominant species, and *Poa* spp. (especially *P. secunda*), *Koeleria macrantha*, *Stipa comata*, *Balsamorhiza sagittata*, *Phlox muscoides*, *P. longifolia*, *Antennaria* spp., and *Eriogonum* spp. often are present. Stands in the eastern part of the association's geographic range, in Montana, Wyoming, and Colorado, often contain *Bouteloua gracilis* as well. *Festuca idahoensis* and *Melica* spp. are absent or contribute much less cover to the undergrowth than do other species. The sub-shrubs *Gutierrezia sarothrae* and *Artemisia frigida* often are present in the undergrowth.

CLASSIFICATION COMMENTS: **ARCHIVED:** This type has been combined the *Artemesia. tridentata* ssp. *vaseyana* - *Purshia tridentata* / *Pseudoroegneria spicata* Shrub association (CEGL001032, G5Q, Distr.: NV). This type now is identified as CEGL002673, *Artemesia. tridentata* ssp. *vaseyana* - (*Purshia tridentata*) / *Pseudoroegneria spicata* Shrub association

SIMILAR COMMUNITIES: The *A. tridentata* ssp. *vaseyana* - *Symphoricarpos oreophilus* / *Pseudoroegneria spicata* shrub association contains stands with substantial amounts of other shrubs (*S. oreophilus*, *Prunus virginiana*, *Amelanchier alnifolia*, *Ribes cereum*), while this *A. tridentata* ssp. *vaseyana* / *P. spicatum* shrub association lacks those species or contains only small amounts of them. The *A. tridentata* / *Festuca idahoensis* shrub association has an undergrowth with substantial amounts of *F. idahoensis*, and *Melica bulbosa*, while those species are absent or present in small amounts in stands of this *A. tridentata* ssp. *vaseyana* / *P. spicatum* shrub association

OTHER NAMES: *Artemisia tridentata / Agropyron spicatum* (MONT) habitat type (Mueggler and Stewart (1980)|*Artemisia tridentata* ssp. *vaseyana* / *Agropyron spicatum* community type (Cooper et al. 1995)|*Artemisia vaseyana / Agropyron spicatum* habitat type (Hironaka et al. 1983)|*Artemisia tridentata* ssp. *vaseyana* / *Symphoricarpos oreophilus - Agropyron spicatum* habitat type (Bramble-Brodahl 1978)|*Artemisia tridentata* var. *pauciflora - Purshia tridentata* / *Elymus spicatus* plant association (Tart 1996)|*Artemisia tridentata* ssp. *vaseyana* / *Agropyron spicatum* habitat type (Lewis 1975)|*Artemisia tridentata* ssp. *vaseyana* / *Agropyron spicatum* community type (Jensen et al. 1988))|*Artemisia tridentata* ssp. *vaseyana* / *Agropyron spicatum* plant association (Baker and Kennedy 1985)|North Park range resource type (Terwilliger and Smith 1978)|*Artemisia tridentata* / *Roegneria spicata* plant association (Johnston 1987)|*Artemisia tridentata* / *Agropyron* without *Purshia tridentata* type and *Artemisia tridentata - Purshia tridentata* / *Agropyron* type (Current 1984)

RELATION TO OTHER NAMES: +|+|+|+|?|+|-|-|+|+

COMMENTS ON OTHER NAMES: The habitat type of Mueggler and Stewart (1980) also includes stands dominated by *A. tridentata* ssp. *wyomingensis*; the vegetation they describe has a sparse shrub cover and therefore fits into a shrub herbaceous association, but they note that grazing may increase the amount of sagebrush, so stands dense enough to qualify as this association can be expected on their habitat type.|The community type of Cooper and others

(1995) includes stands with shrub layers sparse enough to qualify as shrub herbaceous vegetation.||Bramble-Brodahl's (1978) *A. tridentata* ssp. *vaseyana* / *S. oreophilus - A. spicatum* habitat type includes stands with little *Symphoricarpos* spp. That fit into this association and also includes stands that belong in the *A. tridentata* ssp. *vaseyana - Symphoricarpos oreophilus* / *Pseudoroegneria spicata* shrub association||Tart (1996) subdivides *A. tridentata* ssp. *vaseyana* into three taxa. *A. tridentata* var. *pauciflora* dominates the lowest-elevation, driest of the stands.|Lewis's (1975) habitat type apparently supports vegetation belonging to other mountain big sagebrush associations.|Baker's and Kennedy's (1985) association contains stands with shrub cover as sparse as 15%, which qualifies as shrub herbaceous vegetation rather than shrub vegetation.|The vegetation of Terwilliger and Smith (1978) is described based on production rather than cover; *A. tridentata* ssp. *vaseyana* contributes only ca. 10% of the production, and that information, combined with a photograph, suggests that the shrub canopy cover is less than 25% and this vegetation is shrub herbaceous vegetation rather than shrub vegetation.|Johnston's (1987) plant association includes vegetation dominated by *A. tridentata* ssp. *wyomingensis*.|Current (1984) includes in his types stands with a range in relative amounts of *A. tridentata* ssp. *vaseyana* and *Purshia tridentata*, from pure sagebrush canopy to pure bitterbrush canopy. He also includes a stand with a scant sagebrush layer.

ECOREGIONAL DISTRIBUTION:
|M331B:CP|M331D:CC|M331E:CP|M331H:CC|M331I:CC|M331J:CC|M332B:CP|M332E:CC342B:CC|341G:PP|342B:CP

STATE DISTRIBUTION: This association has been described from Montana, Wyoming, Colorado, Nevada, Utah, and Idaho. It may also occur in Alberta (L. Allen, pers. comm).

NORTHERN GREAT PLAINS NATIONAL FOREST DISTRIBUTION: This association is unlikely to occur on any national forests or national grasslands of the Northern Great Plains because *A. tridentata* ssp. *vaseyana* does not extend far enough east (Beetle and Johnson 1982; S. Cooper, Montana Natural Heritage Program, personal communication, 11/11/98)

ENVIRONMENTAL DESCRIPTION: Stands of this association generally grow on the warmest and driest sites that support *A. tridentata* ssp. *vaseyana* vegetation types (Tart 1996, Lewis 1975). Landscape positions are mainly south- or west-facing slopes, although some stands occur on nearly flat ridge tops. Soils generally are moderately deep to deep, well drained, of loam, sandy loam, clay loam, or gravelly loam textural classes, often have a substantial volume of coarse fragments, and are derived from a variety of parent materials (although sandstones, limestones, and crystalline rocks predominate). Elevations range from 5,000-6,000 feet in southwestern Montana, 6,500-9,000 feet in Wyoming, 7,000-8,500 feet in northwestern Colorado, and 6,000-10,000 feet in northeastern Nevada

VEGETATION DESCRIPTION: *Artemisia tridentata* ssp. *vaseyana* usually dominates the shrub layer and may be the only shrub present. *Purshia tridentata* often is present and may contribute as much cover as does the big sagebrush. *Chrysothamnus nauseosus*, *C. viscidiflorus*, *Symphoricarpos oreophilus*, *Ribes cereum*, and *Rosa woodsii* often are present in smaller amounts. The undergrowth generally is moderately dense to dense; grasses contribute more cover than do forbs. *Pseudoroegneria spicata* is the dominant species, and *Poa* spp. (especially *P. secunda*), *Koeleria macrantha*, *Stipa comata*, *Balsamorhiza sagittata*, *Phlox muscoides*, *P. longifolia*, *Antennaria* spp., and *Eriogonum* spp. Often are present. Stands in the eastern part of the association's geographic range, in Montana, Wyoming, and Colorado, often contain *Bouteloua gracilis* as well. *Festuca idahoensis* and *Melica* spp. Are absent or contribute much less cover to the undergrowth than do other species. The sub-shrubs *Gutierrezia sarothrae* and *Artemisia frigida* often are present in the undergrowth.

NATURAL DISTURBANCES: Soils supporting stands of this association often are unstable and prone to mass movement (Bramble-Brodahl 1978).

CONSERVATION RANK: G5

RANK JUSTIFICATION:

MANAGEMENT COMMENTS: Grazing increases the amount of *Poa secunda*, *A. tridentata* ssp. *vaseyana* and (possibly) forbs, and decreases the amount of *Pseudoroegneria spicata* (Baker and Kennedy 1985). In Idaho, *A. tridentata* ssp. *vaseyana* is an important browse species. Retaining a fair abundance of the shrub is a good practice on big game winter ranges. *P. spicata* is palatable and decreases with continued close grazing, while relatively unpalatable forbs such as *Achillea millefolium*, *Microsteris gracilis*, *Collinsia parviflora*, and *Lupinus* spp. increase, as does area of bare ground (Hironaka et al. 1983).

DATABASE CODE: CEGL001030

REFERENCES:

Baker, W.L. and S.C. Kennedy. 1985. Presettlement vegetation of part of northwestern Moffat County, Colorado, described from remnants. Great Basin Naturalist 45:747-777.

Bramble-Brodahl, M.K. 1978. Classification of *Artemisia* vegetation in the Gros Ventre area, Wyoming. M.S. Thesis, University of Idaho, Moscow.

Cooper, S.V., P. Lesica, R.L. DeVelice, and J.T. McGarvey. 1995. Classification of southwestern Montana plant communities with emphasis on those of Dillon Resource Area, Bureau of Land Management. Montana Natural Heritage Program, Helena MT. 152 pp.

Current, F.B. 1984. The distribution and description of the vegetation of Battle Mountain as explained by abiotic factors. Unpublished dissertation, University of Wyoming, Laramie.

Hironaka, M., M.A. Fosberg, and A.H. Winward. 1983. Sagebrush-grass habitat types of southern Idaho. Forestry, Wildlife, and Range Experiment Station Bulletin No. 15, University of Idaho, Moscow. 44 pp.

Jensen, M.E., L.S. Peck, and M.V. Wilson. 1988. Vegetation characteristics of mountainous northeastern Nevada sagebrush community types. Great Basin Naturalist 48 (4): 403-421.

Lewis, Mont E. 1975. Plant communities of the Jarbidge Mountain complex, Humboldt National Forest. USDA Forest Service, Intermountain Region. 18 pp.

Mueggler, W.F. and W.L. Stewart. 1980. Grassland and shrubland habitat types of western Montana. USDA Forest Service General Technical Report INT-66. Intermountain Forest and Range Experiment Station, Ogden UT. 155 pp.

Tart, David L. 1996. Big sagebrush plant associations of the Pinedale Ranger District. Final Review Draft. Bridger-Teton National Forest, Jackson WY. 97 pp.

Terwilliger, C., Jr. and E.L. Smith. 1978. Range resource types in North Park, Colorado. Colorado State University Range Science Department Science Series 32. 48 pp.

Willoughby, M., M.J. Alexander, and K.M. Sundquist. 1998. Range plant community types and carrying capacity for the montane subregion, third approximation. Environmental Protection, Lands and Forest Services, Edmonton, Alberta. 156 pp.

CLASS: HERBACEOUS VEGETATION

FORMATION: MEDIUM-TALL TEMPERATE OR SUBPOLAR GRASSLAND WITH A SPARSE NEEDLE-LEAVED OR MICROPHYLLOUS EVERGREEN SHRUB LAYER (V.A.7.N.E)
ALLIANCE: ARTEMISIA TRIDENTATA SHRUB HERBACEOUS ALLIANCE

ARTEMISIA TRIDENTATA / PASCOPYRUM SMITHII SHRUB HERBACEOUS VEGETATION

COMMON NAME: Big Sagebrush / Western Wheatgrass shrub Herbaceous Vegetation

COLLOQUIAL NAME: Big Sagebrush / Western Wheatgrass Shrub Grassland

COMMUNITY SUMMARY: This broadly defined Big Sagebrush Shrub Grassland type occurs in North Dakota, South Dakota, Montana, Wyoming, Colorado, Utah, and Idaho. It may also occur in Washington and Oregon. Stands with *Artemisia tridentata* ssp. *wyomingensis* - dominated shrub layers occupy dry rolling uplands with shallow to moderately deep soils belonging to loam and finer textural classes. Stands with *A.rtemsia tridentata* ssp. *tridentata* - dominated shrub layers occur in draws and on alluvial terraces with deeper soils. This association contains grassland vegetation with a sparse shrub layer dominated by one of the subspecies of *Artemisia tridentata*. The herbaceous undergrowth contains a mix of graminoids and forbs dominated by *Pascorpyrum smithii*. Other common species are *Bouteloua gracilis* (on the Great Plains), *Stipa comata*, *Koeleria macrantha*, and *Carex filifolia*.

CLASSIFICATION COMMENTS: **ARCHIVED:** This association contains a mix of vegetation types that will be placed into *Artemisia. tridentata* ssp. *tridentata*, *Artemisia. tridentata* ssp *vaseyana*, or *Artemisia. tridentata* ssp *wyomingensis* associations. The following specific comments are made about the information sources cited as the basis for this association.

The vegetation of the Great Plains *Artemisia tridentata* / *Agropyron smithii* habitat type of Hanson and Hoffman (1988) must belong to the *A. tridentata* ssp. *wyomingensis* / *Pascopyrum smithii* Shrub Herbaceous association, given that Wyoming big sagebrush is the only subspecies that extends eastward onto the Great Plains of Montana (S. Cooper, Montana Natural Heritage Program, pers. comm., 11/98) and North Dakota (Jensen et al. 1992). Two pieces of evidence suggest that Van Pelt's (1978) western wheatgrass community on his Stevens Canyon Bench site also belongs to the *A. tridentata* ssp. *wyomingensis* / *Pascopyrum smithii* Shrub Herbaceous association. First, the photograph of the site appears to contain *A. tridentata* ssp. *wyomingensis*. Second, the elevation of his site, at 6,500 feet, is within the elevation range cited by Welsh et al. (1993) for *A. tridentata* ssp. *wyomingensis*. Similarly, the vegetation of Brotherson's and Brotherson's (1979) site 9 apparently also belongs to the *A. tridentata* ssp. *wyomingensis* / *Pascopyrum smithii* association, because their site lies at an elevation between 6000 feet and 7000 feet, which is mostly within the range given for *A. tridentata* ssp. *wyomingensis* but below the elevation given for *A. tridentata* ssp. *vaseyana* by Welsh et al. (1993).

Graham (1937) is cited as a reference for this association, but he does not mention western wheatgrass as an important species in either of his *Artemisia* types. His mid-altitude *Artemisia* associations of the sub-montane shrub zone at 7,000-8,000 feet elevation are above the elevation zone of 5,000-6,5000 feet give by Welsh et al. (1993) for *A. tridentata* ssp. *wyomingensis*, and the sagebrush in a photograph of a mid-altitude *Artemisia* association appears to be *A. tridentata* ssp. *vaseyana*. Graham's low altitude *Artemisia* association, up to ca. 6500 feet elevation, apparently is within the elevation range of *A. tridentata* ssp. *wyomingensis*, but no vegetation type with *Pascopyrum smithii* in the undergrowth is described. The sagebrush vegetation type of Mariah

Association (1981) appears, from their photograph, to contain *A. tridentata* ssp. *wyomingensis*, but the associated herbaceous species are exotics and the original vegetation is impossible to infer; consequently, whether their vegetation belongs to this association is unknown.

SIMILAR COMMUNITIES:

OTHER NAMES:

RELATION TO OTHER NAMES:

COMMENTS ON OTHER NAMES:

ECOREGIONAL DISTRIBUTION:
331D:CC|331F:CC|331G:CC|M331B:CC|342A:CC|342F:CC|342G:CC

STATE DISTRIBUTION: If this association is defined to include all *Pascopyrum smithii* - dominated grasslands with a sparse shrub layer dominated by *Artemisia tridentata*, then it occurs in North Dakota, South Dakota, Montana, Wyoming, Colorado, Utah, and Idaho. It may also occur in Washington and Oregon.

NORTHERN GREAT PLAINS NATIONAL FOREST DISTRIBUTION: Stands of this association occur in the Little Missouri and Thunder Basin National Grassland and in the Ashland, Sioux, and Grand River Districts of the Custer National Forest. They may also occur in the Buffalo Gap and Oglala National Grasslands. (The stands in the Northern Great Plains that might be placed into this association should be recognized as belonging to the *A. tridentata* ssp. *wyomingensis* / *Pascopyrum smithii* Shrub Herbaceous association, because Wyoming big sagebrush is the only subspecies that extends eastward into the region.)

ENVIRONMENTAL DESCRIPTION: Stands of this association with *A. tridentata* ssp. *wyomingensis* - dominated shrub layers occupy dry rolling uplands with shallow to moderately deep soils belonging to loam and finer textural classes. Stands with *A. tridentata* ssp. *tridentata* - dominated shrub layers occur in draws and on alluvial terraces with deeper soils.

VEGETATION DESCRIPTION: *Artemisia tridentata* dominates a sparse shrub layer (< 25% canopy cover). The particular subspecies of big sagebrush depends on the geographic location and environment of the stand. The composition of the undergrowth also depends on the geographic location and the environment of the stand, but all stands contain a substantial amount of *Pascopyrum smithii*.

NATURAL DISTURBANCES:

CONSERVATION RANK: G5Q

RANK JUSTIFICATION: The "Q" portion of the rank indicates the uncertainty over the validity of this type, arising from the inclusion of stands dominated by any of the three subspecies of *Artemisia tridentata*.

MANAGEMENT COMMENTS:

DATABASE CODE: CEGL001007

REFERENCES:

Brotherson, J.D. and K.J. Brotherson. 1979. Ecological and community relationships of *Eriogonum corymbosum* (Polygonaceae) in the Uinta Basin, Utah. Great Basin Naturalist 39: 177-191.

Graham, E.H. 1937. Botanical studies in the Uinta Basin of Utah and Colorado. Annals of the Carnegie Museum 26: 28-432.

Hansen, P.L. and G.R. Hoffman. 1988. The vegetation of the Grand River/Cedar River, Sioux, and Ashland Districts of the Custer National Forest: a habitat type classification. USDA Forest Service General Technical Report RM-157, Rocky Mountain Forest and Range Experiment Station, Fort Collins CO. 68 pp.

Jensen, M., F. Heisner, J. DiBenedetto, L. Wessman and G. Phillips. 1992. Ecological sites and habitat types of the Little Missouri National Grassland and western North Dakota (Draft II). Custer National Forest, Billings, MT and Northern Region, USDA Forest Service, Missoula, MT. Not paginated.

Mariah Associates. 1981. Vegetation baseline data analysis, Alton Coal lease study area. Volume 6, Chapter 3, Appendix 3.6

Van Pelt, N.S. 1978. Woodland parks in southeastern Utah. Unpublished thesis, University of Utah, Salt Lake City.

Welsh, S.L., N.D. Atwood, S. Goodrich, and L.C. Higgins. 1993. A Utah flora. Second edition, revised. Brigham Young University, Provo UT.

CLASS: HERBACEOUS VEGETATION

FORMATION: MEDIUM-TALL TEMPERATE OR SUBPOLAR GRASSLAND WITH A SPARSE NEEDLE-LEAVED OR MICROPHYLLOUS EVERGREEN SHRUB LAYER (V.A.7.N.E)
ALLIANCE: ARTEMISIA TRIDENTATA SHRUB HERBACEOUS ALLIANCE

ARTEMISIA TRIDENTATA / BOUTELOUA GRACILIS SHRUB HERBACEOUS VEGETATION

COMMON NAME: BIG SAGEBRUSH / BLUE GRAMA SHRUB HERBACEOUS VEGETATION

COLLOQUIAL NAME: BIG SAGEBRUSH / BLUE GRAMA SHRUB PRAIRIE

COMMUNITY SUMMARY: This sagebrush steppe community is found in the northern Great Plains. Stands are found on the tops of level to gently rounded ridges and uplands, where exposure to winds is high, or on upper slopes and stream terraces. Coarse fragments and gravels are abundant in the substrate surface and upper soil horizons, which are weakly developed and fine-textured. Shrub cover is low, averaging between 5 and 15%, and the shrubs may only be between 0.2 and 0.5 m tall. Herbaceous cover varies from 50 to 90%, with open soil and rock fragments prominent in the drier stands. The dominant shrub is *Artemisia tridentata* (most likely *ssp. wyomingensis*), with occasional associates of *Artemisia frigida, Eriogonum ovalifolium, Eriogonum pauciflorum*, and *Opuntia polyacantha*. The graminoid layer is dominated by *Bouteloua gracilis, Pascopyrum smithii,* and *Pseudoroegneria spicata.* Typical associates include *Koeleria macrantha, Poa secunda,* and *Stipa comata*. The forb component is very sparse, and not very consistent, but includes such species *as Arenaria hookeri, Astragalus spatulatus, Gutierrezia sarothrae* (sometimes considered a low shrub), *Phlox hoodii* and others. Generally, this type appears to represent the more heavily grazed phase of either the *Artemisia tridentata/Pseudoroegneria spicata* Shrub Herbaceous Vegetation or the *Artemisia tridentata/Pascopyrum smithii* Shrub Herbaceous Vegetation.

CLASSIFICATION COMMENTS: **ARCHIVED.** In North Dakota, *Artemisia tridentata ssp wyomingensis* is the only subspecies present (D. Lenz personal communication 1998).^ This type appears to be a result of splitting out a *Bouteloua gracilis* dominated variant from two other

types, the *Artemisia tridentata/Pseudoroegneria spicata* Shrub Herbaceous Vegetation (CEGL001535) and the *Artemisia tridentata/Pascopyrum smithii* Shrub Herbaceous Vegetation (CEGL001007). In eastern Wyoming, Thilenius et al. (1995) separated an *Artemisia tridentata/Boutelous gracilis-Agropyron spicatum* shrub-steppe from an *Artemisia tridentata/Agropyron spicatum* shrub-steppe. *Bouteloua gracilis* is the characteristic species and *Agropyron spicatum (= Pseudoroegneria spicata)* has low coverage. The type occurs on the tops of level to gently rounded ridges, with abundant coarse fragments and medium-coarse textured soils, whereas the latter type was found on mid to upper, steeper slopes with fine to medium textured soils. In North Dakota, Hirsch (1985) describes an *Artemisia tridentata/Bouteloua gracilis* type in southwestern North Dakota codominated by *Agropyron smithii*, and it occurs on fine-textured shallow soils. She noted that it is similar to the *Artemisia tridentata /Agropyron smithii* type. Other authors have described how *Bouteloua gracilis* increases in dominance in heavily grazed stands in either the *Artemisa tridentata/Pseudoroegneria spicata* Shrub Herbaceous type (Mueggler and Stewart 1980) or the *Artemisia tridentata/Pascopyrum smithii* Shrub Herbaceous type (Hansen and Hoffman 1988). Thus, this type will be treated as a grazing variant of either of those two types (CEGL001007, CEGL001535). However, George Jones (personal communication suggests that 1007 itself needs to be eliminated because it does not specify the subspecies of *Artemisia tridentata.* Thus his more complete recommendation is as follows:

- *Artemisia tridentata /Bouteloua gracilis* (#2196): archived and stands divided into other types.
- *Artemisia tridentata spp. wyomingensis/Pseudoroegneria spicata* shrub herbaceous assoc. (#1535) should get the stands from #2196 with *Artemisia tridentata spp. wyomingensis* - dominated shrub layers and undergrowths with a lot of *Pseudoroegneria spicata*
- *Artemisia tridentata spp. wyomingensis /Pascopyrum smithii-Bouteloua gracilis-Carex filifolia* shrub association (not recognized, no CEGL code yet, but see below). Should get stands from #2196 with *Artemisia tridentata spp. wyomingensis* –dominated shrub layers and undergrowths with lots of *Pascopyrum smithii* .
- *Artemisia tridentata spp. wyomingensis /Pascopyrum smithii* shrub assoc. (#1047). Name should be changed. If this is a type of mesic draws, then the name should be changed to *Artemisia tridentata spp. wyomingensis /Pascopyrum smithii – Nasella viridula* shrub association. If it is a type from drier uplands, then the name should be changed to *Artemisia tridentata spp. wyomingensis /Pascopyrum smithii-Bouteloua gracilis-Carex filifolia shrub association* and we will not need to add the type mentioned in the preceding paragraph.

SIMILAR COMMUNITIES: *Artemisia tridentata ssp. wyomingensis / Pseudoroegneria spicata* Shrub Herbaceous Vegetation (CEGL001535); *Artemisa tridentata ssp. wyomingensis / Pseudoroegneria spicata* Shrubland (CEGL001009); *Artemisia tridentata / Pascopyrum smithii* Shrub Herbaceous Vegetation (CEGL001007); *Artemisia tridentata ssp. wyomingensis / Pascopyrum smithii* Shrubland (CEGL001047)

OTHER NAMES: *Artemisia tridentata/Boutelous gracilis-Agroyron spicatum* shrub-steppe (Thilenius et al. 1995) | Sagebrush-Grass (USDI 1979) |Artemisia tridentata/Bouteloua gracilis habitat type (Hirsch 1985) | Artemisia tridentata ssp. tridentat / Bouteloua gracilis (Johnston 1987)

RELATION TO OTHER NAMES: = | B| = | I

COMMENTS ON OTHER NAMES: | The USDI type includes a number of sagebrush - grassland types.| | Johnston notes sources who describe this type from northern New Mexico

ECOREGIONAL DISTRIBUTION:331F Northwestern Great Plains Section:C

STATE DISTRIBUTION:ND, SD, WY

NORTHERN GREAT PLAINS NATIONAL FOREST DISTRIBUTION: Custer National Forest?, Thunder Basin National Grassland

ENVIRONMENTAL DESCRIPTION: Stands are found on the tops of level to gently rounded ridges and uplands, where exposure to winds is high (Thilenius et al. 1995) or on upper slopes and stream terraces (Hirsch 1985). In Wyoming, coarse fragments and gravels are abundant in the substrate surface and upper soil horizons, which are weakly developed and fine-textured in (Thilenius et al. 1995). In North Dakota, soils are shallow, fine-textured, and somewhat alkaline in pH (Hirsch 1985).

VEGETATION DESCRIPTION: Shrub cover is low, averaging between 5 and 15%, and the shrubs may only be between 0.2 and 0.5 m tall. Herbaceous cover may vary from 25 – 90% with open soil and rock fragments prominent in the drier stands. The dominant shrub is *Artemisia tridentata*, with occasional associates of *Artemisia frigida, Eriogonum ovalifolium, Eriogonum pauciflorum* and *Opuntia polyacantha.* The graminoid layer is dominated by *Bouteloua gracilis, Pascopyrum smithii*, and *Pseudoroegneria spicata*. Typical associates include *Koeleria micrantha, Poa secunda*, and *Stipa comata*. The forb component is very sparse, and not very consistent, but includes such species as *Arenaria hookeri, Astragalus spatulatus, Gutierrezia sarothrae* (sometimes considered a low shrub), *Phlox hoodii* and others (USDI 1979, Thilenius et al. 1995).

NATURAL DISTURBANCES: Fires may have historically maintained the relatively low shrub cover of this type, based on observations of *Artemisia tridentata* cover elsewhere (Mueggler and Stewart 1980).

CONSERVATION RANK: G?Q

RANK JUSTIFICATION: This type cannot easily be ranked until its classification status is resolved.

MANAGEMENT COMMENTS: In Montana and the western Dakotas, Mueggler and Stewart (1980) and Hansen and Hoffman (1988) comment that heavy grazing in *the Artemisia tridentata / Pseudoroegneria spicata* Shrub Herbaceous Vegetation type (CEGL001018, and CEGL001535?) may result in a decrease of *Pseudoroegneria spicata*, and usually *Stipa viridula*, and substantial increases in *Bouteloua gracilis, Bromus japonicus, Poa pratensis* and *Poa sandbergii*, as well as in unpalatable low shrubs *Artemisia frigida, Gutierrezia sarothrae*, and *Opuntia polyacantha*. *Artemisa tridentata* may also increase. The type is best grazed by cattle in early spring and late fall. It is not well suited for sheep because of the low abundance of forbs.

DATABASE CODE: CEGL002196

REFERENCES:

Hansen, P. L., and G. R. Hoffman. 1988. The vegetation of the Grand River/Cedar River, Sioux, and Ashland Districts of the Custer National Forest: A habitat type classification. U. S. Dep. Agric., For. Serv., Rocky Mt. For. And Range Exp. Sta. Gen. Tech. Rep. RM-157. Fort Collins, Colo. 68 p.

Heidl, B. 1984. Plant community classification of North Dakota. Unpublished manuscript, North Dakota Natural Heritage Program, Bismarck, ND. 19 p.

Hirsch, K.J. 1985. Habitat type classification of grasslands and shrublands of southwestern North Dakota. Ph.D. Thesis. NDSU, Fargo, ND.

Johnston, B. C. 1987. Plant associations of region two: potential plant communities of Wyoming, South Dakota, Nebraska, Colorado, and Kansas. R2-ECOL-87-2. U. S. Dep. Agric., For. Serv., Rocky Mt. Reg. Lakewood, Colo. 429 p.

Mueggler, W. F. and W. L. Stewart. 1980. Grassland and shrubland habitat types of western Montana. USDA Forest Service General Tech. Report INT-66. Intermountain Forest & Range Experiment Station, Ogden, Utah. 155 pp.

Thilenius, J. F., G. R. Brown, and A. L. Medina. 1995. Vegetation of semi-arid rangelands, Cheyenne River Basin, Wyoming. U. S. Dep. Agric., For. Serv., Rocky. Mt. For. Range Exp. Sta. Gen. Tech. Rep. RM-GTR-263. 60 p. Fort Collins, Co.

USDI Bureau of Land Management. 1979. Final environmental impact statement, proposed development of coal resources in Eastern Powder River, Wyoming. 67 pp.

CLASS: HERBACEOUS VEGETATION

FORMATION: MEDIUM-TALL TEMPERATE OR SUBPOLAR GRASSLAND WITH A SPARSE NEEDLE-LEAVED OR MICROPHYLLOUS EVERGREEN SHRUB LAYER (V.A.7.N.E)
ALLIANCE: ARTEMISIA TRIDENTATA SHRUB HERBACEOUS ALLIANCE

ARTEMISIA TRIDENTATA / FESTUCA IDAHOENSIS SHRUB HERBACEOUS VEGETATION

COMMON NAME: Big Sagebrush / Idaho Fescue

COLLOQUIAL NAME: Big Sagebrush / Idaho Fescue Shrub Prairie

COMMUNITY SUMMARY: This Big Sagebrush Shrub Prairie type is a very broadly distributed association, occurring throughout the Intermountain West, northern Great Basin, Northwest and into the intermountain valleys of southern British Columbia primarily as a matrix type or as large patches. The enormous geographic and ecological scope of this association is largely attributable to the fact that subspecies of *A. tridentata* have not been specified; thus the type occurs on all manner of parent material, from limestone to granitics to alluvium with all variety, except heavy-textured, soils represented. Characteristic elevations are conditioned by geographic location, ranging from 1,200 to approximately 3,200 ft in the greater Columbia Basin and Okanogan Valley to 4,000 to 8,000 plus feet in southwestern Montana and due to factor compensation yet higher elevations of occurrence are recorded as one proceeds in a southerly direction. Depending on soil moisture holding capacity and insolation load it can occur in landscapes with as little as 10 inches annual precipitation or with as much as 30 inches (on southerly exposures). Landscape positions vary from intermontane valleys in the Northwest to the upper slopes, bordering on alpine habitat, of dry mountain ranges within the Northern, Middle and Southern Rocky Mountains and Great Basin. It is most often found from footslopes to upper backslope positions of hills and foothills environments. The composition is highly variable as well, due to differences in floras associated with particular geographic regions. Though Daubenmire (1968) indicated ssp. *tridentata* was the primary subspecies associated with this type

in the Northwest, other sagebrush taxonomy experts indicate (not unanimously) that a tall form of subspecies *wyomingensis* is most likely to be the dominant form, subspecies *tridentata* having largely been put under the plow (R. Crawford pers. comm.). To the interior, all three subspecies are associated with high coverages of *Festuca idahoensis* to define this syntaxon; however, the greatest areal extent of the type is thought to have subspecies *vaseyana* dominant. Other broadly distributed shrubs that occur frequently, but with low coverages, include *Artemisia frigida, Chrysothamnus nauseosus, C. viscidiflorus,* and *Gutierrezia sarothrae*. *Pseudoroegneria spicata* and *Koeleria macrantha* are often co-dominant with *F. idahoensis*. The forb component is highly dependent on geographical setting, usually drawing on species of the following genera, *Balsamorhiza, Crepis, Senecio, Lupinus, Eriogonum,* and *Castilleja*.

CLASSIFICATION COMMENTS: **ARCHIVED:** This association will be archived and the plots which substantiated it should be reassigned to the those associations defined by the dominant subspecies of *Artemisia tridentata* present; in many cases this will not be possible because *A. tridentata* taxonomy was either not worked out or applied at the time the plots were taken (however voucher specimens can be consulted in some instances). There also exist various concepts as to what *F. idahoensis* canopy cover value, or cover value with repect to that of other species, should be used for type recognition; some (Daubenmire 1968) recognize the indicator value of the species, accepting its mere presence as indicative of the type, others (Mueggler and Stewart 1980, Cooper et al. 1995) use a 5% lower limit of cover and still others (Hironaka et al. 1983) invoke the concept of relative dominance (between *F. idahoensis* and *Pseudoroegneria spicata*).

SIMILAR COMMUNITIES: The *Artemisia tridentata* ssp. *vaseyana* / *Festuca idahoensis* and *A. tridentata* ssp. *vaseyana* / *F. idahoensis – Bromus carinatus* (Mooney 1985) associations explicitly identify that named subspecies as the domiant shrub. *A. tridentata* ssp. *tridentata* / *F. idahoensis* (Jensen et al. 1988) has subspecies *tridentata* as the named shrub dominant. Both the *A. tridentata* spp. *Tridentata / Pseudoroegneria spicata* and *A. tidentata ssp. / Festuca idahoensis* habitat types, as defined by Hironaka et al. (1983), could have considerable amounts of *Festuca idahoensis*; *P. spicata* must ewere dominant.

OTHER NAMES: *Artemisia tridentata / Festuca idahoensis* habitat type (Daubenmire 1968, Mueggler and Stewart 1980)| *Artemisia tridentata / Festuca idahoensis* community type (Willoughby et al. 1998)| *Artemisia tridentata* ssp. *vaseyana / Festuca idahoensis* plant association (Johnson and Simon 1987)

RELATION TO OTHER NAMES: -|-

COMMENTS ON OTHER NAMES: Mueggler and Stewart (1980) noted several subspecies of *A. tridentata* occurred in this type (though ssp. *vaseyana* was most commonly represented) and also recognized two phases, *Geranium viscossisimum* and undesignated, both of which should be recognized at the association level so as to not lose track of the specific ecological parameters associated with each. Daubenmire (1968) indicated he was dealing with subspecies *tridentata* in eastern Washington and thus his stands should be incorporated into an *A. tridentata ssp. tridentata / Festuca idahoensis* association.

ECOREGIONAL DISTRIBUTION: M333:C| M332:C| M331:C| 342:C| M334:C| M341:C|

STATE DISTRIBUTION: The following states and provinces support this type, if a more refined taxonomic level (beyond species) is not specified; Montana, Colorado, Wyoming, Oregon, Nevada, Washington, Idaho, British Columbia, Alberta and Utah (?).

NORTHERN GREAT PLAINS NATIONAL FOREST DISTRIBUTION: Lewis and Clark, Custer, Shoshone and Bighorn National Forests all have lands supporting this type and border on

the Northern Great Plains, only the Custer National Forest exhibits this type and is partially embedded within the Northern Great Plains.

ENVIRONMENTAL DESCRIPTION: This a very broadly distributed association, occurring throughout the Intermountain West, northern Great Basin, Northwest and into the intermountain valleys of southern British Columbia primarily as a matrix type or as large patches. The enormous geographic and ecological scope of this association is largely attributable to the fact that subspecies of *A. tridentata* have not been specified; thus the type occurs on all manner of parent material, from limestone to granitics to alluvium with all but heavy-textured soils. Characteristic elevations are conditioned by geographic location, ranging from 1,200 to approximately 3,200 ft in the greater Columbia Basin and Okanogan Valley to 4,000 to 8,000 plus feet in southwestern Montana and due to factor compensation yet higher elevations of occurrence are recorded as one proceeds in a southerly direction. Depending on soil moisture storage properties and insolation load it can occur in landscapes with as little as 10 inches annual precipitation or with as much as 30 inches (on southerly exposures). Landscape positions vary from intermontane valleys in the Northwest to the upper slopes, bordering on alpine habitat, of dry mountain ranges within the Northern, Middle and Southern Rocky Mountains (United States) and Great Basin. Probably it is most often associated with footslopes to upper backslope positions of hills and foothills environments. This association is usually noted to grade to *A. tridentata / Pseudoroengneria spicata* on warmer, drier sites and to *F. idahoensis – P. spicata* or various *Pseudotsuga menziesii*- or *Pinus flexilis*- dominated communities on cooler exposures, though the actual sequence of communities will be determined largely by geographic setting.

VEGETATION DESCRIPTION: The highly variable composition of the vegetation reflects the huge geographic (as embodied in floristic differences) and ecological scope of this type. Though Daubenmire (1968) indicated *tridentata* was the primary subspecies associated with this type in the Northwest, other sagebrush taxonomy experts indicate (not unamimously) that a tall form of subspecies *wyomingensis* is most likely to be the existing dominant form, subspecies *tridentata* having largely been put under the plow (R. Crawford pers. comm.). To the interior, all three subspecies are associated with high coverages of *Festuca idahoensis* to define this syntaxon; however, the greatest areal extent of the type is thought to have subspecies *vaseyana* dominant (Tweit and Houston 1980, Mueggler and Stewart 1980). The gross physiognomy of the type varies with the subspecies of *Artemisia*, from short statured ssp. *wyomingensis* (<0.5 m tall) to robust ssp. *tridentata* (often >1.25 m tall). *A. tridentata* cover ranges widely but many stands have values between 8 to 20%. Other broadly distributed shrubs that occur frequently, but with low coverages, include *Artemisia frigida, Chrysothamnus nauseosus, C. viscidiflorus* and *Gutierrezia sarothrae*. *Pseudoroegneria spicata, Koeleria macrantha* and *Poa sandbergii* are often co-dominant with *F. idahoensis*. The forb component is highly dependent on geographical setting usually drawing on species of the following genera, *Balsamorhiza*, *Crepis*, *Senecio*, *Lupinus*, *Erigeron*, *Eriogonum*, and *Castilleja*.

NATURAL DISTURBANCES: The presettlement fire return interval for this type was quite variable, ranging between 10 and 65 years; a 10 year interval is insufficient time for for *A. tridentata* to reestablish and reach sexual maturity and thus these short-interval burns would have to be colonized (by *A. tridentata*) repeatedly from sources outside the burns.

CONSERVATION RANK: G4Q

RANK JUSTIFICATION: It should be a pressing concern to resolve the taxonomy of this type, which will probably result in a loss of some information where *Artemisia tridentata* identification was not taken to the subspecies level.

MANAGEMENT COMMENTS: The dominant and sub-dominant grasses of this type are among the most palatable of range grasses and not resilient to overgrazing (Mueggler and Stewart 1980).

This type is often viewed as needing conversion to grassland to increase range productivity; this is accomplished by controlled burning, herbicide application, rotobeating, and chaining. Most grass production gains are short-lived and not economical in the long-term (Harniss and Murray 1973).

DATABASE CODE: CEGL001530

REFERENCES:

Crawford, R. 1998. Community ecologist, Washington Natural Heritage Program, Olympia, WA.

Daubenmire, R. F. 1970. Steppe vegetation of Washington. Washington State University Agricultural Experiment Station Technical Bulletin No. 62. 131 pp.

Harniss, R. O. and R. B. Murray. 1973. 30 years of vegetal change following burning of sagebrush-grass range. Journal of Range Management 26(5): 322-325.

Hironaka, M., M. A. Fosberg, and A. H. Winward. 1983. Sagebrush-grass habitat types of southern Idaho. Forestry, Wildlife, and Range Experiment Station Bulletin No. 15, University of Idaho, Moscow. 44 pp.

Jensen, M. E., L. S. Peck and M. V. Wilson. 1988. A sagebrush community type classification for mountainous northeastern Nevada rangelands. Great Basin Naturalist 48(4): 422-433.

Johnson, C. G. Jr. and S. A. Simon. 1987. Plant associations of the Wallowa-Snake Province. USDA Forest Service, Region 6, Wallowa-Whitman National Forest R6-ECOL-TP-2558A-86. 400 pp. + append.

Mooney, M. J. 1985. A preliminary classification of high elevation sagebrush-grass plant vegetation in northern and central Nevada. Unpublished thesis, University of Nevada, Reno. 118 pp.

Mueggler, W. F. and W. L. Stewart. 1980. Grassland and shrubland habitat types of western Montana. USDA Forest Service General Tech. Report INT-66. Intermountain Forest & Range Experiment Station, Ogden, Utah. 155 pp.

Tweit, S. and K. Houston. 1980. Grassland and shrubland habitat types of the Shoshone National Forest. USDA Forest Service, Rocky Mountain Region, Shoshone National Forest.

Willoughby, M., M. J. Alexander and K. M. Sundquist. 1998. Range plant community types and carrrying capacity for the Montane Subregion, Third Approximation. Environmental Protection, Lands and Forest Services, Edmonton, Alberta. 156 pp.

CLASS: HERBACEOUS VEGETATION

FORMATION: MEDIUM-TALL TEMPERATE OR SUBPOLAR GRASSLAND WITH A SPARSE NEEDLE-LEAVED OR MICROPHYLLOUS EVERGREEN SHRUB LAYER (V.A.7.N.E)
ALLIANCE: ARTEMISIA TRIDENTATA SSP. WYOMINGENSIS SHRUB HERBACEOUS ALLIANCE

ARTEMISIA TRIDENTATA SSP. WYOMINGENSIS / MIXED GRASSES SHRUB HERBACEOUS VEGETATION

COMMON NAME: Wyoming Big Sagebrush/Mixed Grasses Shrub Herbaceous Vegetation

COLLOQUIAL NAME: Big Sagebrush/Mixedgrasses Shrub Prairie

COMMUNITY SUMMARY: This Wyoming Big Sagebrush Shrub Steppe type is found in the northwestern Great Plains region in Wyoming. Stands occur on a variety of soils. The vegetation contains a sparse shrub layer in which *Artemisia tridentata* ssp. *wyomingensis* dominates, along with a number of other shrrub species, a shrub layer that often contains a number of other species, especially *Chrysothamnus* spp., *Atriplex confertifolia*, *Sarcobatus vermiculatus*, and *Tetradymia canescens*. *Pascopyrum smithii* dominates the herbaceous layer in some stands and co-dominates with one or more other grasses (*Bouteloua gracilis*, *Stipa comata*, *Koeleria macrantha*, *Carex filifolia*, and *Poa secunda*) in most stands. Sub-shrubs, principally *Atriplex gardneri*, *Artemisia frigida*, and *Gutierrezia sarothrae*, often are present but only rarely do they contribute more than a trace of cover. *Phlox hoodii*, *Sphaeralcea coccinea*, *Opuntia polyacantha*, *Plantago patagonica*, and *Allium* spp. Are the most common forbs. Cheatgrasses (*Bromus tectorum*, *B. japonicus*, *B. commutatus*) usually are present and may contribute substantial cover.

CLASSIFICATION COMMENTS: **ARCHIVED:** With additional review, this association will be archived and split into two new asociations. This association was described from Wyoming mainly to include *A. tridentata* ssp. *wyomingensis* stands that fall in the middle of a continuum between stands with *Pascopyrum smithii-Bouteloua gracilis* - dominated undergrowth on one end and *Stipa comata-Bouteloua gracilis* - dominated undergrowth on the other (Jones 1991). Because these sparse shrublands are essentially grasslands with an open shrub layer, dividing them into associations involves the same uncertainty as dividing the related grasslands into associations. The grassland continuum has been divided into the *Pascopyrum smithii - Bouteloua gracilis* association and the *Stipa comata - Bouteloua gracilis* association, the *P. smithii - B. gracilis - Carex filifolia* association and the *S. comata - B. gracilis - Carex filifolia* association. The continuum of the related sparse shrublands (that is, the grasslands with sparse shrub layers) should be divided the same way. That division would result in the elimination of this association, and placement of its stands into an *A. tridentata* ssp. *wyomingensis* / *Pascopyrum smithii - Bouteloua gracilis* association and an *A. tridentata* ssp. *wyomingensis* / *Stipa comata - Bouteloua gracilis* association.

SIMILAR COMMUNITIES: In the *Artemisia tridentata* ssp. *wyomingensis* / *Pseudoroegneria spicata* shrub herbaceous association (CEGL001535), the herbaceous layer is dominated by *P. spicata* and may contain a smaller amount of *Pascopyrum smithii*.

OTHER NAMES:

RELATION TO OTHER NAMES:

COMMENTS ON OTHER NAMES:

ECOREGIONAL DISTRIBUTION: 331F:CC|342G:CC

STATE DISTRIBUTION: This association has been named only from Wyoming.

NORTHERN GREAT PLAINS NATIONAL FOREST DISTRIBUTION:

ENVIRONMENTAL DESCRIPTION:

VEGETATION DESCRIPTION: This is a grass vegetation type with an open shrub layer (10% - 25% cover) and small amounts of forbs. The breadth of variation in the composition of the vegetation reflects the status of this association as a catch-all for a variety of stands. *Artemisia tridentata* ssp. *wyomingensis* dominates the shrub layer, which may contain a number of other shrubs, especially *Chrysothamnus* spp., *Atriplex confertifolia*, *Sarcobatus vermiculatus*, and *Tetradymia canescens*. *Pascopyrum smithii* dominates the herbaceous layer in some stands and co-dominates with one or more other grasses (*Bouteloua gracilis, Stipa comata, Koeleria macrantha, Carex filifolia*, and *Poa secunda*) in most stands. Sub-shrubs, principally *Atriplex gardneri*, *Artemisia frigida*, and *Gutierrezia sarothrae*, often are present but only rarely do they contribute more than a trace of cover. *Phlox hoodii*, *Sphaeralcea coccinea*, *Opuntia polyacantha*, *Plantago patagonica*, and *Allium* spp. Are the most common forbs. Cheatgrasses (*Bromus tectorum, B. japonicus, B. commutatus*) usually are present and may contribute substantial cover.

NATURAL DISTURBANCES:

CONSERVATION RANK: G5

RANK JUSTIFICATION: The low rank reflects the common occurrence of this association. If this association is retained in the classification, the notation "Q" should be added to the rank to reflect the uncertainty of the its status.

MANAGEMENT COMMENTS:

DATABASE CODE: CEGL001534

REFERENCES:

Jones, G.P. 1992. Wyoming plant community classification. Wyoming Natural Diversity Database, Laramie WY. Revised June 1992. Unpublished.

CLASS: HERBACEOUS VEGETATION

FORMATION: MEDIUM-TALL TEMPERATE OR SUBPOLAR GRASSLAND WITH A SPARSE NEEDLE-LEAVED OR MICROPHYLLOUS EVERGREEN SHRUB LAYER (V.A.7.N.E)
ALLIANCE: ARTEMISIA CANA SHRUB HERBACEOUS ALLIANCE

ARTEMISIA CANA / CAREX INOPS SSP. HELIOPHILA SHRUB HERBACEOUS VEGETATION

COMMON NAME: Coaltown Sagebrush / Long-Stolon Sedge

COLLOQUIAL NAME: Silver Sagebrush / Sedge Shrub Prairie

COMMUNITY SUMMARY: This association has been described only for central Custer County, Montana where it occurs on loams and fine, sandy loams weathered from sedimentary parent materials. It occupies topography ranging from ridges to swales but is most common on midslopes, topographically above the *A. cana / Pascopyrum smithii* association, to which it frequently grades, and below *Stipa comata / Bouteloua* spp or other graminoid-diminated types.

This is termed a herbaceous vegetation type with shrub component because graminoids, foremost among which are *C. inops* ssp. *heliophila* and *Bouteloua gracilis*, are manifestly dominant (average of 73% canopy cover). The only shrub of consequence, *A. cana* (probably *A. cana* ssp. *cana* [Shultz 1984]), averages only 12 % cover. Forbs on average comprise 18% canopy cover and *Cerastium arvense, Artemisia ludoviciana, Psoralea argophylla* and *Ratibida columnifera* contribute the greatest part thereof.

CLASSIFICATION COMMENTS: **ARCHIVED.** This association will be archived until sufficient data exist for its complete description. This association, originally specified as *A. cana / Stipa spp. / Carex heliophila* (syn. *C. inops* ssp. *heliophila*) by Culwell and Scow (1982), is curently known by the more abbreviated epithet of *A. cana / C. inops* ssp. *heliophila* (CEGL001553), which should reduce chances of its being confused with the more prevalent *A. cana / Stipa comata* association. A significant problem is how to field distinguish this type from *A. cana / P. smithii*, especially in the Custer County vicinity, where the original describers of the type (Culwell and Scow 1982) present data showing that these two types have all the same graminoids in common, differing only in their relative proportions. Cutoff values for *P. smithii, C. inops* ssp. *heliophila*, and *Nasella viridula* should be sought which would separate their respective associations or this type should be combined with *A. cana / P. smithii* (see SIMILAR COMMUNITIES). Also pertinent is the fact that *C. inops* ssp. *heliophila*, though the dominant graminoid in half the stands representing the type, was absent from the other half and no alternative indicator was mentioned that might be used to distinguish/identify this type.

SIMILAR COMMUNITIES: In the landscape where it was originally sampled this community was noted to grade to *A. cana / Pascopyrum smithii* found on more mesic, even temporarily flooded sites with *P. smithii* dominant and it has a moderately close floristic resemblance to *A. cana / Stipa comata* on the drier side of the moisture gradient. It is also quite similar to the *A. cana / Nasella viridula* (syn. *Stipa viridula) – Bouteloua gracilis* community type described by Prodgers (1978); because of the prominence of *N. viridula* Prodgers postulated that *A. cana / N. viridula – B. gracilis* is a moister, less livestock-impacted phase of the *A. cana / P. smithii* type. Accepting Prodgers' hypothesis would place more than half the stands representing *A. cana / C. inops* much closer ecologically to *A. cana / P. smithii* than to *A. cana / S. comata* (in fact this group of stands having *N. viridula* prominent would be more mesic [or less intensively grazed] than the *A. cana / P. smithii* type described for the Custer County, MT inventory area of Culwell and Scow [1982]).

OTHER NAMES: *Artemisia cana / Stipa* spp. - *Carex heliophila* (syn. *C. inops* ssp. *heliophila*) community type (Culwell and Scow 1982)| *Artemisia cana / Nasella viridula* (syn. *Stipa viridula) – Bouteloua gracilis* community type (Prodgers 1978)|

RELATION TO OTHER NAMES: =|-|

COMMENTS ON OTHER NAMES:

ECOREGIONAL DISTRIBUTION: Powder River Basin Section (331G):CC|

STATE DISTRIBUTION: This association has been recorded for only Montana; it was noted only once, exact location unspecified, in the course of rapid ecological assessment (Martin et al. 1998).

NORTHERN GREAT PLAINS NATIONAL FOREST DISTRIBUTION:

ENVIRONMENTAL DESCRIPTION: This association has been documented from a narrow elevation range (2.950 to 3,160 ft) as occurring on moderately deep loams and fine, sandy loams weathered from sedimentary parent materials. It generally occupies gentle to moderate slopes (6-30%) of varying, but mostly northerly, aspects. Characteristic topography ranges from ridges to

swales but the type is most common on midslopes (backslopes), topographically above the *A. cana / Pascopyrum smithii* association, to which it frequently grades.

VEGETATION DESCRIPTION: This is termed a herbaceous vegetation type with shrub component because graminoids, foremost among which are *C. inops* ssp. *heliophila* and *Bouteloua gracilis*, are manifestly dominant (average of 73% canopy cover). Other important graminoids are mid-sized (*P. smithii, Nasella viridula, Stipa comata* and *Poa pratensis*), which qualifies this as a mixed-grass type. The only shrub of consequence, *A. cana* (probably *A. cana* ssp. *cana* [Shultz 1984]), averages only 12 % cover. Forbs on average comprise 18% canopy cover and *Cerastium arvense, Artemisia ludoviciana, Psoralea argophylla, Ratibida columnifera* and *Aster falcatus* contribute the greatest part thereof.

NATURAL DISTURBANCES:

CONSERVATION RANK: G3Q

RANK JUSTIFICATION: Though it ostensibly is common in the 20,000 acre study area from which it was described (on the basis of 10 plots), it has subsequently only once been identified and this lone occurrence was out of thousands of points inventoried in the course of rapid ecological assessment in the Northern Great Plains (Martin et al. 1998). None of the biotopes occupied, nor any of the characteristic species occupying them, are rare or even unusual. This type seemingly is the result of some fortuitous juxtaposition of habitat/environment and species mix. The type occurs where grazing impacts have not been severe and condition has been rated fair to good. Besides the threat of overgrazing and possible subsequent weed incursion, strip mining remains the prime threat.

MANAGEMENT COMMENTS: Culwell and Scow (1981, 1982) observed that *Bromus japonicus* is a major invader of moist disturbed sites, especially *A. cana* bottoms, whereas *B. tectorum* preferrs drier disturbed sites such as denoted by *A. cana / Stipa comata*; however both drier and moister *A. cana* sites supported more dense alien brome populations than other sites in the landscapes they inventoried.

DATABASE CODE: CEGL001550

REFERENCES:

Culwell, L. D. and K. L. Scow. 1981. Vegetation inventory of the Youngs Creek study area, Big Horn County, Montana, 1980. Unpublished report for Shell Oil Co. Westech, Helena, Montana. 57 pp. + app.

Culwell, L.D. and K.L. Scow. 1982. Terrestrial vegetation inventory: Dominy Project Area, Custer County, Montana 1979-1980. Unpublished technical report for Western Energy Company by Westech, Helena, Montana. 144 pp. + 15 pp. + app.

Martin, B., S. Cooper, B. Heidel, T. Hildebrand, G. Jones, D. Lenz and P. Lesica. 1998. Natural community inventory within landscapes in the Northern Great Plains Steppe Ecoregion of the United States. A report to the Natural Resource Conservation Service, Northern Plains Regional Office. 211 pp.

Shultz, L. M. 1984. Taxonomic and geographic limits of *Artemisia* subgenus Tridentatae (Beetle) McArthur (Asteraceae: Anthemideae). *In* McArthur, E. D. and B. L. Welch, compilers. Proceedings—symposium on the biology of Artemisia and Chrysothamnus; 1984 July 9-13; Provo, UT. USDA Forest Service, General Technical Report INT-200. Intermountain Research Station, Ogden, UT. 398 pp.

CLASS: HERBACEOUS VEGETATION

FORMATION: SHORT TEMPERATE OR SUBPOLAR GRASSLAND WITH A SPARSE MICROPHYLLOUS EVERGREEN SHRUB LAYER (V.A.7.N.J)
ALLIANCE: ARTEMISIA CANA SHRUB SHORT HERBACEOUS ALLIANCE

ARTEMISIA CANA SSP. CANA / BOUTELOUA GRACILIS SHRUB HERBACEOUS VEGETATION

COMMON NAME: SILVER SAGEBRUSH/BLUE GRAMA

COLLOQUIAL NAME: SILVER SAGEBRUSH/BLUE GRAMA SHRUB PRAIRIE

COMMUNITY SUMMARY: This association is a sod-grass type with scattered silver sagebrush, growing on alluvial terraces along larger streams in the northern Great Plains of northeastern Wyoming.

CLASSIFICATION COMMENTS: **ARCHIVED.** This association will be archived until sufficient data exist to validate it. The validity of this association is questionable; it appears to contain vegetation transitional between the *Pascopyrum smithii - Bouteloua gracilis - Carex filifolia* association (CEGL001579)(or a similar association) of uplands and an *Artemisia cana* ssp. *cana* type (perhaps the *A. cana* ssp. *cana* / *Pascopyrum smithii* association) of draws. According to the reference from which it was named, Thilenius et al. (1995), it occurs on alluvial terraces and contains a sparse component of *A. cana* ssp. *cana* (average canopy cover of only 7.9% for six stands), a shrub that grows on alluvial sites in the Great Plains. But the herbaceous stratum is composed mainly of species characteristic of the upland vegetation (*Bouteloua gracilis*, *Pascopyrum smithii*, *Stipa comata*), and indicators of the more mesic, alluvial sites (*Nassella viridula*, *Poa juncifolia*) are missing.

SIMILAR COMMUNITIES: The *Artemisia cana* ssp. *cana* / *Pascopyrum smithii* shrub herbaceous association occupies very similar sites but contains *Nassella viridula* and other species characteristic of mesic sites. The *Artemisia cana* ssp. *cana* / *Calamovilfa longifolia* shrub herbaceous association may contain *Bouteloua gracilis* as a co-dominant in the undergrowth, but it differs from this association in having *Calamovilfa longifolia* as a co-dominant or dominant species in the undergrowth, and in growing on sandy soils of upland sites.

OTHER NAMES: *Artemisia cana / Agropyron smithii* Habitat Type (Hansen and Hoffman 1988)| *Artemisia cana / Agropyron smithii* Habitat Type (Hansen et al. 1995)|10-14" Northern Great Plains precipitation zone, Overflow range site (USDA Soil Conservation Service 1988)

RELATION TO OTHER NAMES: +|+|?

COMMENTS ON OTHER NAMES: Stands classified in this *Artemisia cana* ssp. *cana / Bouteloua gracilis* association may represent disturbed vegetation growing on the *Artemisia cana / Agropyron smithii* Habitat Type. The description of the landscape positions and soils occupied by this type suggests that it occurs on the Overflow range site.

ECOREGIONAL DISTRIBUTION: 331F:CC|331G:CC

STATE DISTRIBUTION: This association has been described from a single study in northeastern Wyoming

NORTHERN GREAT PLAINS NATIONAL FOREST DISTRIBUTION: Thunder Basin National Grassland.

ENVIRONMENTAL DESCRIPTION: Stands of this association grow on alluvial terraces at least 1 meter above the floodplain, in deep, medium- to fine-textured soils (Thilenius et al. 1995).

VEGETATION DESCRIPTION: *Artemisia cana* ssp. *cana* is noticeable but the short (< 0.5 m), widely-spaced shrubs contribute little canopy cover. Herbaceous vegetation covers about half of the soil surface. *Bouteloua gracilis* generally dominates the undergrowth; *Pascopyrum smithii* is a secondary species that contributes substantial cover; and several other grasses (*Stipa comata*, *Calamovilfa longifolia*, *Oryzopsis hymenoides*) may be locally abundant, but none regularly contributes much cover. Forbs are often present but all contribute little cover. Much of the soil surface is bare.

NATURAL DISTURBANCES:

CONSERVATION RANK: G3?

RANK JUSTIFICATION: "Q" should be added to the rank of this association to indicate the uncertainty over its validity.

MANAGEMENT COMMENTS: Response of *Artemisia cana* ssp. *cana* to grazing depends on its palatability to different browsing animals, which is unclear from the literature: Hansen et al. (1995) report it as being unpalatable for cattle but palatable for sheep, while Beetle and Johnson (1982) report that it is eaten readily by all classes of wildlife and livestock (especially sheep) in winter, and USDA Soil Conservation Service (1988) lists it as desirable for cattle, sheep, and horses and preferred for deer and pronghorn. Stubbendieck (1986) report that the species increases with cattle grazing. This rhizomatous shrub sprouts readily following mowing or burning (Beetle and Johnson 1982), but it may be eliminated with herbicides (Hansen et al. 1995). *Bouteloua gracilis* increases after disturbance, and this grass is a major species in disturbed stands but minor in undisturbed stands (Hansen et al. 1995).

DATABASE CODE: CEGL001554

REFERENCES:

Beetle, Alan A. and Kendall. L. Johnson. 1982. Sagebrush in Wyoming. University of Wyoming Agricultural Experiment Station Bulletin 779. Laramie WY. 68 pp.

Hansen, Paul L. and George R. Hoffman. 1988. The vegetation of the Grand River/Cedar River, Sioux, and Ashland Districts of the Custer National Forest: a habitat type publication. USDA Forest Service General Technical Report RM-157, Fort Collins CO.

Hansen, Paul L., Robert D. Pfister, Keith Boggs, Bradley J. Cook, John Joy, and Dan K. Hinckley. 1995. Classification and management of Montana's riparian and wetland sites. Montana Forest and Conservation Experiment Station miscellaneous publication no. 54. 646 pp.

Stubbendieck, J., Stephan L. Hatch, and Kathie J. Hirsch. 1986. North American range plants. 3rd edition. University of Nebraska Press. 465 pp.

Thilenius, John F. and Gary R. Brown. 1990. Vegetation on semi-arid rangelands, Cheyenne River Basin, Wyoming. Unpublished report, USDA Forest Service. 69 pp.

Thilenius, John F., Gary R. Brown, and Alvin L. Medina. 1995. Vegetation on semi-arid rangelands, Cheyenne River Basin, Wyoming. USDA Forest Service General Technical Report RM-GTR-263. Fort Collins, CO. 60 pp.

USDA Soil Conservation Service. 1988. Range site technical guides for Wyoming.

CLASS: HERBACEOUS VEGETATION

FORMATION: TALL SOD TEMPERATE GRASSLAND (V.A.5.N.A)
ALLIANCE: ANDROPOGON HALLII HERBACEOUS ALLIANCE

ANDROPOGON HALLII - STIPA COMATA HERBACEOUS VEGETATION

COMMON NAME: SAND BLUESTEM-NEEDLE-AND-THREAD

COLLOQUIAL NAME: SAND BLUESTEM - NEEDLE-AND-THREAD SAND PRAIRIE

COMMUNITY SUMMARY: This sand bluestem prairie is found in the Northern Great Plains in Montana. Stands are dominated by *Andropogon hallii* and *Stipa comata*. Insufficient information exists to characterize this type further, but it may represent a somewhat more mature successional phase of the *Andropogon hallii - Carex inops ssp. heliophila* Herbaceous Vegetation (CEGL001466). It can probably be combined with that type.

CLASSIFICATION COMMENTS: **ARCHIVED.** Insufficient information exists to characterize this type further, but information in Ross et al. (1973), who may be the source of this type, have yet to be reviewed. This type may represent a somewhat more mature successional phase of the *Andropogon hallii - Carex inops ssp. heliophila* Herbaceous Vegetation (CEGL001466). It can probably be combined with that type.

Steve Kettler (CO HP personal communication 1998) indicates that he has used this type for an occurrence in east-central Colorado (near Limon), where a stand occurred on the higher (50-100 year?) floodplain of a sandy plains stream. It was several hundred acres in size. *Andropogon hallii* and *Stipa comata* were dominant with *Bouteloua gracilis* forming a low understory. Scattered *Populus deltoides* occurred on the wide floodplain. The site has a history of good management (HRM grazing) but the owner said a lot has changed on the ranch since they started HRM about 10-15 years ago. The NRCS range site describes these stands as also having a fair amount of *Panicum virgatum*, *Calamovilfa longifolia*, and *Sorghastrum nutans*; this one didn't.

SIMILAR COMMUNITIES: CEGL001466 *Andropogon hallii - Carex inops ssp. heliophila* Herbaceous Vegetation, CEGL001469 *Calamovilfa longifolia-Andropogon hallii* Herbaceous Vegetation

OTHER NAMES:

RELATION TO OTHER NAMES:

COMMENTS ON OTHER NAMES:

ECOREGIONAL DISTRIBUTION: 331G Powder River Basin Section:C, 331D Northwestern Glaciated Plains Section:C

STATE DISTRIBUTION: MT

NORTHERN GREAT PLAINS NATIONAL FOREST DISTRIBUTION:

ENVIRONMENTAL DESCRIPTION: Insufficient information available, but see Ross et al. (1973).

VEGETATION DESCRIPTION: Insufficient information available, but see Ross et al. (1973).

NATURAL DISTURBANCES:

CONSERVATION RANK: G3?

RANK JUSTIFICATION: Recommend changing rank to GQ until classification status can be resolved.

MANAGEMENT COMMENTS:

DATABASE CODE: CEGL001468

REFERENCES:

Ross, R.L., E.P. Murray, and J.G. Haigh. 1973. Soil and vegetation inventory of near-pristine sites, Montana. USDA Soil Conservation Service, Bozeman, Montana. 55 pp.

CLASS: HERBACEOUS VEGETATION

FORMATION: TALL SOD TEMPERATE GRASSLAND (V.A.5.N.A)
ALLIANCE: CALAMOVILFA LONGIFOLIA HERBACEOUS ALLIANCE

CALAMOVILFA LONGIFOLIA - ANDROPOGON HALLII HERBACEOUS VEGETATION

COMMON NAME: Prairie Sandreed - Sand Bluestem Herbaceous Vegetation

COLLOQUIAL NAME: Prairie Sandreed - Sand Bluestem Prairie

COMMUNITY SUMMARY: This sand prairie is found in the northern Great Plains on sandy deposits, usually on gentle to moderate slopes. The soil is sand, loamy sand, or sandy loam and often erodible. This community is dominated by moderately widely spaced mid- to tall grasses. The most abundant species is *Calamovilfa longifolia*. *Andropogon hallii* is common, but rarely co-dominant. Other graminoids that may be found in this community include *Bouteloua gracilis, Carex eleocharis, Carex filifolia, Carex inops* ssp. *heliophila, Stipa comata, Koeleria macrantha, Muhlenbergia pungens,* and *Schizachyrium scoparium*. Forbs and shrubs are a minor component of the total vegetation. *Euphorbia serpyllifolia, Lappula occidentalis* var. *occidentalis, Liatris punctata, Lithospermum incisum, Lygodesmia juncea*, and *Psoralidium lanceolatum* may occur in this community. *Artemisia frigida* and *Yucca glauca* are the most common shrubs. In southeastern North Dakota, tallgrass species such as *Andropogon gerardii, Aster ericoides, Lithospermum canescens, Solidago nemoralis,* and *Sporobolus heterolepis* may occur.

CLASSIFICATION COMMENTS: **ARCHIVED.** After review, this type has been combined with - *Andropogon hallii – Calamovilfa longifolia* Herbaceous Vegetation, (CEGL001467). Else, this type needs a diagnostic species that would indicate its more northern distribution compared to CEGL001467 *Andropogon hallii – Calamovilfa longifolia* Herbaceous Vegetation. Perhaps *Carex filifolia* or *Carex inops* ssp. *heliophila* may be useful. This description needs more range-wide information. Note that Looman (1980) describes this type for Manitoba, but these northern stands also contain *Carex foenea, Danthonia spicata*, and *Festuca ovina*. Currently the North Dakota Heritage Program restricts this type primarily to the tallgrass prairie region of the state, where sands are deep, as described in part by Burgess (1965); however, it is reported further west in southwest North Dakota (Hirsch 1985) and Montana. Range-wide application of this type needs further review. In Minnesota, relatively small *Calamovilfa longifolia*-dominated patches can occur in dry sand prairies or barrens, particularly on crests of dunes, but these are treated as part of CEGL005204 – the *Schizachyrium scoparium – Stipa spartea – Bouteloua (curtipendula,*

gracilis) Herbaceous Vegetation). *Andropogon hallii* does not occur as a native species in Minnesota.

SIMILAR COMMUNITIES: CEGL001467 - *Andropogon hallii – Calamovilfa longifolia* Herbaceous Vegetation, CEGL001466 - *Andropogon hallii – Carex inops. Ssp. heliophila* Herbaceous Vegetation type, CEGL005204 – *Schizachyrium scoparium – Stipa spartea – Bouteloua (curtipendula, gracilis)* Herbaceous Vegetation.

OTHER NAMES: Climax Sandhill Prairie (Burgess 1965) | Andropogon hallii – Calamovilfa longifolia habitat type (Hirsch 1985)

RELATION TO OTHER NAMES: = | =

COMMENTS ON OTHER NAMES: Type contains equal amounts of *Andropogon hallii* and *Calamovilfa longifolia*, vegetation cover is high, and diverse | Although the order of the names is reversed, Hirsch's type seems to fit this type pretty well, since her type contains equal amounts of *Andropogon hallii* and *Calamovilfa longifolia*, vegetation cover is high (> 90%), species diversity is moderate, and the type occurs on thin, erodable sands.

ECOREGIONAL DISTRIBUTION: 331E:C, 251Ab?, 332:?

STATE DISTRIBUTION: SK, MB, ND, SD, MT

NORTHERN GREAT PLAINS NATIONAL FOREST DISTRIBUTION:

ENVIRONMENTAL DESCRIPTION: This community is found on sandy deposits, usually on gentle to moderate slopes (Johnston 1987). The soil is sand, loamy sand, or sandy loam and often erodible. Hirsch (1985) reported that stands of this type in southwestern North Dakota were small, generally less than 400 m^2.

VEGETATION DESCRIPTION: This community is dominated by moderately widely spaced mid- to tallgrasses. Hirsch (1985) found that bare ground and litter covered 84-93% of the ground in 4 stands in southwestern North Dakota. The most abundant species is *Calamovilfa longifolia*. *Andropogon hallii* is common, but rarely co-dominant. Other graminoids that may be found in this community include *Bouteloua gracilis, Carex eleocharis, Carex filifolia, Carex inops* ssp. *heliophila, Stipa comata, Koeleria macrantha, Muhlenbergia pungens*, and *Schizachyrium scoparium*. Forbs and shrubs are a minor component of the total vegetation. *Euphorbia serpyllifolia, Lappula occidentalis var. occidentalis, Liatris punctata, Lithospermum incisum, Lygodesmia juncea*, and *Psoralidium lanceolatum* may occur in this community. *Artemisia frigida* and *Yucca glauca* are the most common shrubs. In southeastern North Dakota, tallgrass species such as *Andropogon gerardii, Aster ericoides, Lithospermum canescens, Solidago nemoralis*, and *Sporobolus heterolepis* may occur (Burgess 1965).

NATURAL DISTURBANCES: Blowouts may occur in this community type, leading to bare soils or subsoils. Blowouts may be caused by severe droughts and windstorms, and may occur in conjunction with grazing pressures that reduce the ability of the vegetation cover to stabilize the sand. This type may be a later successional stage on these blowouts where sands have been stabilized and vegetation cover and diversity are high (the *Andropogon hallii – Carex inops. Ssp. heliophila* Herbaceous Vegetation type, CEGL001466, may be the early successional phase) (Burgess 1965).

CONSERVATION RANK: G3

RANK JUSTIFICATION: This type has a relativey restricted distribution in terms of site characteristics, but has a moderately wide distribution in the northern Great Plains. Stands are typically less than a few hectares in size. Threats are not known.

MANAGEMENT COMMENTS:

DATABASE CODE: CEGL001469

REFERENCES:

Burgess, R.L. 1965. A study of plant succession in the sandhills of southeastern North Dakota. Proceedings of the North Dakota Academy of Science 19:62-80.

Greenall, J. A. 1995. Draft element descriptions for natural communities of southern Manitoba (prairie and parkland regions). Manitoba Conservation Data Centre, Winnipeg. 17p.

Hirsch, K.J. 1985. Habitat type classification of grasslands and shrublands of southwestern North Dakota. Ph.D. Thesis. NDSU, Fargo, ND.

Johnston, B. C. 1987. Plant associations of region two: potential plant communities of Wyoming, South Dakota, Nebraska, Colorado, and Kansas. R2-ECOL-87-2. U. S. Dep. Agric., For. Serv., Rocky Mt. Reg. Lakewood, Colo. 429 p.

Looman, J. 1980. The vegetation of the Canadian Prairie Provinces II. The grasslands, part 1. Phytocoenologia. 8(2):153-190.

CLASS: HERBACEOUS VEGETATION

FORMATION: TALL SOD TEMPERATE GRASSLAND (V.A.5.N.A)
ALLIANCE: CALAMOVILFA LONGIFOLIA HERBACEOUS ALLIANCE

CALAMOVILFA LONGIFOLIA - CAREX FILIFOLIA HERBACEOUS VEGETATION

COMMON NAME: Prairie Sandreed - Threadleaf Sedge Herbaceous Vegetation

COLLOQUIAL NAME: Prairie Sandreed Sand Prairie

COMMUNITY SUMMARY: This prairie sandreed grassland community type is found in the Northern Great Plains, with stands dominated by *Calamovilfa longifolia* and *Carex filifolia*. Insufficient information exists to characterize this type further, and it appears to strongly resemble the *Calamovilfa longifolia – Carex inops. Ssp. heliophila* Herbaceous Vegetation type (CEGL001471). It can probably be combined with that type.

CLASSIFICATION COMMENTS**: ARCHIVED.** Insufficient information exists to characterize this type further, but information in Ross et al. (1973), who may be the source of this type, have yet to be reviewed. This type appears to strongly resemble the *Calamovilfa longifolia – Carex inops. Ssp. heliophila* Herbaceous Vegetation type (CEGL001471). It can be combined with that type. Steve Cooper (personal communication 1998) notes that *Carex filifolia* occurs further north and west in MT than does *Carex inops ssp. heliophila* , which also seems to occur on shales that have been weathered to sand particles.

SIMILAR COMMUNITIES: CEGL001471 - *Calamovilfa longifolia – Carex inops. Ssp. heliophila* Herbaceous Vegetation type.

OTHER NAMES:

RELATION TO OTHER NAMES:

COMMENTS ON OTHER NAMES:

ECOREGIONAL DISTRIBUTION: 331D Northwestern Glaciated Plains Section: C, 331G Powder River Basin Section:C

STATE DISTRIBUTION: MT, ND, SD, WY

NORTHERN GREAT PLAINS NATIONAL FOREST DISTRIBUTION:

ENVIRONMENTAL DESCRIPTION: Insufficient information available, but see Ross et al. (1973).

VEGETATION DESCRIPTION: Insufficient information available, but see Ross et al. (1973).

NATURAL DISTURBANCES:

CONSERVATION RANK: G3Q

RANK JUSTIFICATION: The rank should be questioned until classification status can be resolved.

MANAGEMENT COMMENTS:

DATABASE CODE: CEGL001471

REFERENCES: Ross, R.L., E.P. Murray, and J.G. Haigh. 1973. Soil and vegetation inventory of near-pristine sites, Montana. USDA Soil Conservation Service, Bozeman, Montana. 55 pp.

CLASS: HERBACEOUS VEGETATION

FORMATION: TALL SOD TEMPERATE GRASSLAND (V.A.5.N.A)
ALLIANCE: CALAMOVILFA LONGIFOLIA HERBACEOUS ALLIANCE

CALAMOVILFA LONGIFOLIA - PASCOPYRUM SMITHII HERBACEOUS VEGETATION

COMMON NAME: PRAIRIE SANDREED-WESTERN-WHEAT GRASS

COLLOQUIAL NAME: PRAIRIE SANDREED - WESTERN WHEATGRASS PRAIRIE

COMMUNITY SUMMARY: This prairie sandreed grassland community type is found in the Northern Great Plains. Stands are dominated by *Calamovilfa longifolia* and *Pascopyrum smithii*. Insufficient information exists to characterize this type further, and it appears to be identical to the *Calamovilfa longifolia – Carex inops. Ssp. heliophila* Herbaceous Vegetation type (CEGL001471). It should be combined with that type.

CLASSIFICATION COMMENTS: **ARCHIVED.** Insufficient information exists to characterize this type further. Taylor and Holst (1976), who studied grass and shrub plant communities on the Ashland District of Custer National Forest, have been cited as the source of this type, but there is no information in their report that describes any stands with this combination of dominants. They do describe 4 stands dominated by *Calamovila longifolia* (pg. 53), with associates in two of the stands being *Bouteloua curtipendula* and *Festuca idahoensis*. Hansen and Hoffman (1988) did a complete survey of all vegetation types on the Custer National Forest, and they describe only the *Calamovilfa longifolia – Carex inops ssp. heliophila* Herbaceous Vegetation type (CEGL001471). This type should be combined with that type.

SIMILAR COMMUNITIES: CEGL001471 - *Calamovilfa longifolia – Carex inops ssp. heliophila* Herbaceous Vegetation type

OTHER NAMES:

RELATION TO OTHER NAMES:

COMMENTS ON OTHER NAMES:

ECOREGIONAL DISTRIBUTION: 331D Northwestern Glaciated Plains Section:? 331G Powder River Basin Section:C

STATE DISTRIBUTION:MT, SK?

NORTHERN GREAT PLAINS NATIONAL FOREST DISTRIBUTION: Custer National Forest

ENVIRONMENTAL DESCRIPTION: Insufficient information available

VEGETATION DESCRIPTION: Insufficient information available

NATURAL DISTURBANCES:

CONSERVATION RANK: G3Q

RANK JUSTIFICATION: This rank should have a Q until the taxonomy of the type can be resolved.

MANAGEMENT COMMENTS:

DATABASE CODE: CEGL001472

REFERENCES:

Hansen, P. L., and G. R. Hoffman. 1988. The vegetation of the Grand River/Cedar River, Sioux, and Ashland Districts of the Custer National Forest: A habitat type classification. U. S. Dep. Agric., For. Serv., Rocky Mt. For. And Range Exp. Sta. Gen. Tech. Rep. RM-157. Fort Collins, Colo. 68 p.

Taylor, J. E. and T. L. Holst. 1976. Grass and shrub plant community classification. Unpublished Final Report prepared for the Ashland District, USDA Forest Service,under contract 26-3494.

CLASS: HERBACEOUS VEGETATION

FORMATION: MEDIUM-TALL SOD TEMPERATE OR SUBPOLAR GRASSLAND (V.A.5.N.C)
ALLIANCE: STIPA COMATA - BOUTELOUA GRACILIS HERBACEOUS ALLIANCE

STIPA COMATA - BOUTELOUA GRACILIS HERBACEOUS VEGETATION

COMMON NAME: Needle-and-thread - Blue Grama Herbaceous Vegetation

COLLOQUIAL NAME: NEEDLE-AND-THREAD - BLUE GRAMA MIXEDGRASS PRAIRIE

COMMUNITY SUMMARY: *Stipa comata - Bouteloua gracilis* Herbaceous Vegetation is a midgrass community that occurs from the west-central Great Plains to the Rocky Mountain Front of Montana and north well into Saskatchewan, but it is not found east of the Continental Divide. In the west-central Great Plains it has been found on moderate to steep slopes with soil textures ranging from clay loam to sandy loam and loam. In some parts of this region rocks are frequent on the surface, but sandy soils are typical elsewhere. This contrasts with the type as found in the

far western part of its range, the intermontane valleys south of 47E latitude, where it is found on broad alluvial benches, valley floors and gently sloping alluvial fans, representing the driest grassland association in western Montana (8-14 inch precipitation zone). In western Montana this type consistently occurs on Aridisols having free calcium at the surface and up to 25% exposed rock and 34% bare soil. In eastern Montana and North Dakota it occurs almost exclusively on soils with a higher percentage of sand than is represented by adjacent communities; in the landscape these are frequently the highest portions of low ridge systems where sandstone strata are exposed. It is usually manifested as a matrix or large patch type, the exception being in the shale-dominated plains of Montana and the Dakotas where it is a small patch type on projecting ridge crowns and hillocks. *Stipa comata* is the tallest of the dominant species, growing to no more than 1 m in most places. *Bouteloua gracilis* is also abundant. Other species that are commonly found include *Artemisia frigida*, *B. curtipendula*, *Carex filifolia*, *C. stenophylla*, *Pascopyrum smithii*, *Gaura coccinea*, and *Sphaeralcea coccinea*. In Kansas, the Dakotas and eastern Montana characteristic forbs include *Psoralea argophylla, Ratibida columnifera* and *Lygodesmia juncea* whereas in western Montana the only additional high constancy forb is *Liatris punctata*. Total vegetation cover is moderate.

CLASSIFICATION COMMENTS: **ARCHIVED.** This type has been merged with *S. comata – B. gracilis – C. filifolia* (CEGL002037). *S. comata – B. gracilis* is a broadly distributed type that intergrades to all degrees with several other plant associations, at least in the Great Plains portion of its distribution. It grades to the *Pascopyrum smithii – S. comata* and *P. smithii – S. comata – Carex filifolia* types of more moist or heavier-textured soils, to the *S. comata – C. filifolia* and the *S. comata – B. gracilis – Carex filifolia* associations on sites ostensibly having virtually the same abiotic parameters and occurring in the same vegetation matrix, and to the *Calamovilfa longifolia – S. comata* type that characterizes the sandier and more eroded positions. There is no currently no way to make an unequivocal distinction between *S. comata – B. gracilis* and the above named types; the *S. comata – B. gracilis – C. filifolia* association would appear to virtually identical in composition and setting.

SIMILAR COMMUNITIES: *Stipa comata – B. gracilis* is very similar to *S. comata – Carex filifolia*, in fact the two occur in the same landscapes in northcentral Montana (DeVelice et al. 1995), occupying virtually identical positions and are noted to alternate in the landscape, at a small scale (site) and in a manner that is not predictable from readily observed abiotic parameters. This patterning may result from 1) response to unseen factors or 2) some stochastic phenomenon that is operative, such as the first species to colonize a "site" simply has a competitive advantage, at least in the time frame at which we observe these communities or 3) past (and current) grazing practices and patterns. Hansen and Hoffman (1984, 1988) infer that the *S. comata – B. gracilis* type is simply a grazing-induced modification of the *S. comata – Carex filifolia* association; Jensen et al. (1992) would seem to concur with this interpretation as they list *B. gracilis – S. comata*, *B. gracilis – S. comata – C. filifolia* as seral community types within the *S. comata – C. filifolia* habitat type of western North Dakota. *B. gracilis* is 100% constant with 7% cover in the Hansen and Hoffman (1988) *S. comata – C. filifolia* type and DeVelice et al. (1995) record 96% constancy and 4% average cover for *B. gracilis* in the same type. Conversely DeVelice et al. (1995) record 10% average cover and 60% constancy for *C. filifolia* in the *S. comata – B. gracilis* type. For the *Pascopyrum smithii* phase of *S. comata – B. gracilis* recognized by Mueggler and Stewart (1980) possibly half the plots would be assigned to *S. comata – C. filifolia* using the key of Hansen and Hoffman (1988) because of the relative importance of *C. filifolia*. Coupland (1961) has remarked that *C. filifolia* increases in abundance southward from the Canadian prairies, thus eastern Montana may represent a transition zone with mixed representation *of S. comata – B. gracilis* and *S. comata - C. filifolia* as both topoedaphic climaxes and grazing induced disclimaxes of the *P. smithii – B. gracilis* and *P. smithii – C. filifolia* associations. Coupland (1975) described a *S. comata – B. gracilis* type as widely distributed on the Canadian

prairies and which he considered a grazing disclimax of *S. comata – B. gracilis – Agropyron* spp. Because it lacked *Nasella viridula* and *C. filifolia* was abundant. In Wyoming, a very similar *B. gracilis – C. filifolia* sodgrass steppetype (Thilenius et al. 1995) has been described that also has *Stipa comata* with high constancy but only moderate coverage values.

OTHER NAMES: *Stipa comata – Bouteloua gracilis* habitat type (Mueggler and Stewart 1980)∗ *Stipa comata – Bouteloua gracilis – Carex* spp. Faciation (Coupland 1961)∗ *Bouteloua – Stipa* facies (Coupland 1961, 1973)∗ *Stipa comata – Bouteloua gracilis* Sodgrass steppe (Thilenius et al. 1995)∗ *Bouteloua gracilis – Stipa comata* seral community type (Jensen et al. 1992)∗ Bouteloua gracilis – Stipa comata – Carex filifolia seral community type (Jensen et al. 1992)∗

RELATION TO OTHER NAMES: =∗+∗-∗=∗-∗-∗

COMMENTS ON OTHER NAMES:

ECOREGIONAL DISTRIBUTION: Central High Plains Section (331H)CC∗ Northwestern Great Plains Section (331F)CC; Powder River Basin Section (331G)CC∗ Northern Glaciated Plains (331E)CC∗ Northwestern Glaciated Plains (331D); Central High Tablelands Section(331C)CP∗ Belt Mountains Section (M332D)CP∗ Beaverhead Mountains Section (M332E)CC∗

STATE DISTRIBUTION: In Montana this community occurs from the eastern plains nearly to the Rocky Mountain Front escarpment and extends northward into the plains of southern Saskatchewan and Alberta and southward to the eastern plains of Wyoming and Colorado; it occurs in the western portions of North Dakota, South Dakota, , Kansas, and Nebraska (?).

NORTHERN GREAT PLAINS NATIONAL FOREST DISTRIBUTION: Custer National Forest, Little Missouri Grasslands; (Lewis and Clark N. F., Helena-Deerlodge N. F., Gallatin N. F. and Beaverhead N. F. support this association but are not encompassed within the Northern Great Plains)

ENVIRONMENTAL DESCRIPTION: *Stipa comata - Bouteloua gracilis* Herbaceous Vegetation is a midgrass community that occurs from the west-central Great Plains to the Rocky Mountain Front of Montana and north well into Saskatchewan, but it is not found west of the Continental Divide. In the west-central Great Plains it has been found on moderate to steep slopes with soil textures ranging from clay loam to sandy loam and loam. In some parts of this region rocks are frequent on the surface, but sandy soils are typical elsewhere. This expression contrasts with the type as found in the far western part of its range, the intermontane valleys south of 47E latitude, where it is found on broad alluvial benches, valley floors and gently sloping alluvial fans, representing the driest grassland association in western Montana (8-14 inch precipitation zone). In western Montana this type consistently occurs on Aridisols having free calcium at or near the surface and up to 25% exposed rock and 34% bare soil. In eastern Montana, North Dakota, and Wyoming it occurs almost exclusively on soils with a higher percentage of sand (medium to coarse textures) than is represented by adjacent communities; in the Montana and North Dakota landscapes these are frequently the highest portions of low ridge systems where sandstone strata are exposed. Yet the expression of this type in Wyoming's Cheyenne River Basin (Thilenius et al. 1995) is found on level to gently rolling terrain and is not present on sandstone outcrops.

VEGETATION DESCRIPTION: This association is usually manifested as a matrix or large patch type, the known exceptions being in the shale-dominated plains of Montana and the Dakotas where it is generally a small patch type on projecting ridge crowns and hillocks. *Stipa comata* is the tallest of the dominant species, growing to no more than 1 m in most places. *Bouteloua gracilis* is also abundant. Other graminoid species that are commonly found include

Carex filifolia, *C. stenophylla*, *Pascopyrum smithii*, *Elymus lanceolatus*, *Koeleria macrantha* and *B. curtipendula*. There is a reciprocal gradient of prominence moving north to south for *E. lanceolatus* (more important to the north) and *P. smithii*; B. curtipendula also wans in importance to the north and is lacking from the Canadian prairie expressions of the type. This being a distinctly grassland type, the shrub component almost never exceeds 5% total cover, of which a variable mix of the subshrubs, *Artemisia frigida*, *Gutierrezia sarothrae* and *Krascheninnikovia lanata*, constitute more than 90%. In Kansas, the Dakotas and eastern Montana characteristic forbs include *Psoralea argophylla*, *Ratibida columnifera* and *Lygodesmia juncea* whereas in western Montana the only additional high constancy forb is *Liatris punctata*. *Selaginella densa* should be noted as a forb that seems to be sporadically distributed, but which can expand to virtually blanket the ground. Total vegetation cover is moderate to low.

NATURAL DISTURBANCES: Grazing and fire were the primary disturbances prior to European settlement. All the consequences of interrupting these regimes (or changing the dominant grazers in the landscape) are still being appreciated/debated but the most obvious, though indirect, consequence has been the been the expansion of exotic plants.

CONSERVATION RANK: G5

RANK JUSTIFICATION: The numerical value of the rank appears to be warranted but a Q has been appended to indicate that this type has numerous similar types and permutations and the relationship among these entities must be explored.

MANAGEMENT COMMENTS: Regardless of its region of occurrence this type has been plagued with weeds or increaser species. In the northern plains *Bromus japonicus* and *B. tectorum* have become well established where overgrazing has occurred; following fire these two annuals can remarkably increase their density. If this cycle is repeated native graminoids are virtually eliminated. *B. gracilis*, *A. frigida*, *A. dracunculus*, *A. ludoviciana* and a host of native annuals (e.g. Plantago patagonica, *Alyssum allyssoides*, *Hedeoma hispidum*) also increase with overgrazing; the most severe impacts can result in the dominance of *Opuntia polyacantha* and *O. fragilis*. In portions of this type's range, particularly northeastern and northcentral Montana on into the Canadian prairies, *Selaginella densa* can become a major ground cover (90% plus canopy) occupying space once occupied by forbs. Coupland (1961) has suggested *S. densa* cover increases due to protection from grazing and declines with trampling by grazers.

DATABASE CODE: CEGL001699

REFERENCES:

Coupland, R. T. 1950. Ecology of mixed prairie in Canada. Ecological Monographs 20(4): 271-315.

Coupland, R. T. 1961. A reconsideration of grassland classification in the northern Great Plains of North America. Journal of Ecology 49: 135-167.

Coupland, R. T. 1973. A theme study of natural grassland in western Canada. A report to National and Historic Parks Branch, Canada Department of Indian Affairs and Northern Development. 176 pp. + appendix.

DeVelice, R. L., S. V. Cooper, J. T. McGarvey, J. Lichthardt and P. S. Bourgeron. 1995. Plant communities of northeastern Montana: A first approximation. Montana Natural Heritage Program, Helena, MT. 113 pp.

Hansen, P. L. and G. R. Hoffman. 1988. The vegetation of Theodore Roosevelt National Park, North Dakota: A habitat type classfication. USDA Forest Service General Technical Report RM-113, Rocky Mountain Forest and Range Experiment Station, Fort Collins, CO. 35 pp.

Hansen, P. L. and G. R. Hoffman. 1988. The vegetation of the Grand River/Cedar River, Sioux, and Ashland Districts of the Custer National Forest: a habitat type classification. USDA Forest Service General Technical Report RM-157, Rocky Mountain Forest and Range Experiment Station, Fort Collins, CO. 68 pp.

Jensen, M., F. Heisner, J. DiBenedetto, L. Wessman and G. Phillips. 1992. Ecological sites and habitat types of the Little Missouri National Grassland and western North Dakota (Draft II). Custer National Forest, Billings, MT and Northern Region, USDA Forest Service, Missouala, MT. Not paginated.

Martin, B., S. Cooper, B. Heidel, T. Hildebrand, G. Jones, D. Lenz and P. Lesica. 1998. Natural community inventory within landscapes in the Northern Great Plains Steppe Ecoregion of the United States. A report to the Natural Resource Conservation Service, Northern Plains Regional Office. The Nature Conservancy, Helena, MT. 211 pp.

Mueggler, W. F. and W. L. Stewart. 1980. Grassland and shrubland habitat types of western Montana. USDA Forest Service General Tech. Report INT-66. Intermountain Forest & Range Experiment Station, Ogden, Utah. 155 pp.

Thilenius, J. F., G. R. Brown and A. L Medina. 1995. Vegetation on semi-arid rangelands, Cheyenne River Basin, Wyoming. USDA Forest Service General Technical Report RM-GTR-263. Rocky Mountain Forest and Range Experiment Station, Fort Collins, CO. 60 pp.

CLASS: HERBACEOUS VEGETATION

FORMATION: MEDIUM-TALL BUNCH TEMPERATE OR SUBPOLAR GRASSLAND (V.A.5.N.D)
ALLIANCE: PSEUDOROEGNERIA SPICATA HERBACEOUS ALLIANCE

PSEUDOROEGNERIA SPICATA - KOELERIA MACRANTHA HERBACEOUS VEGETATION

COMMON NAME: Bluebunch Wheatgrass-Prairie Koeler's Grass

COLLOQUIAL NAME: Bluebunch Wheatgrass - Junegrass Mixedgrass Prairie

COMMUNITY SUMMARY: This association has not been described, only named on the basis of three plots of "pristine" vegetation inventoried by the Soil Conservation Service; it occurs in the foothills of ranges in southcentral and southwestern Montana within the 10-14 inch precipitation zone on loams and silt loams formed from alluvium and glacial till. The size of these occurrences is undocumented as well. *Pseudoroegneria spicata* conspicuously dominates these sites with *Koeleria macrantha* constituting a weak sub-dominant; other graminoids (*Poa sandbergii*, *Pascopyrum smithii*, *Stipa comata* and *Bouteloua gracilis*) approach 100% constancy but constitute less than 5% of the overall composition. *Artemisia frigida* is consistently present in slightly more than trace amounts. The forb component is also, with the exception of *Astragalus striatus*, weakly represented.

CLASSIFICATION COMMENTS: **ARCHIVED.** Insufficient data currently exist to validate this type. This association has been extracted from the data of just one study (Ross et al. 1973) even though habitat requirements for the type appear to be very general and broadly distributed as are the dominant species; only one site was typed to this association in the course of Rapid Ecological Assessment in the Great Plains-Palouse Dry Steppe Province (Martin et al. 1998).

That this type is found wanting in a landscape where it has the potential to be common to prevalent is perhaps a consequence of the classifiers of this type having not read and/or interpreted the descriptions of Mueggler and Stewart (1980) for some very similar to virtually identical (in part) plant associations, namely *P. spicata – Bouteloua gracilis* (both phases), *P. spicata – Carex filifolia* and *P. spicata – Poa secunda*, before they created *P. spicata – Koeleria macrantha*. *Koeleria macrantha* is widespread, occurs jointly with so many other species, exhibits such variable cover and has such a broad tolerance of soil types that its co-dominance (or even dominance) is an inadvisable criterion for distinguishing an association. Pending analysis of existing data (perhaps augmented by additional sampling), combining this type (or more correctly the stands representing this type) with some, or all, of the above-cited types is recommended.

SIMILAR COMMUNITIES: *Pseudoroegneria spicata – Bouteloua gracilis* (CEGL001664) and *Pseudoroegneria spicata – Poa secunda* (CEGL001677), *Pseudoroegneria spicata – Carex filifolia* (CEGL001665) and *Pseudoroegneria spicata – Pascopyrum smithii* (CEGL001675) all show *Koeleria macrantha* (syn. *K. pyramidata, K. cristata*) to possess nearly 100% constancy and a sizable number of plots wherein it could be considered a graminiod co-dominant; they generally differ by having some number of plots representing the modal expression of the type with a graminoid other than *K. macrantha* dominant.

OTHER NAMES:

RELATION TO OTHER NAMES:

COMMENTS ON OTHER NAMES:

ECOREGIONAL DISTRIBUTION: Beaverhead Mountains Section (M332E): CC| Belt Mountains Section (M332D):CC| Yellowstone Highlands Section (M331A):CC| westernmost fringe of Powder River Basin Section (331G):CC

STATE DISTRIBUTION: This type is described for only Montana but other states (Wyoming, Colorado, North Dakota) without question have habitat to support this type.

NORTHERN GREAT PLAINS NATIONAL FOREST DISTRIBUTION: Beaverhead, Helena, Lewis and Clark, Deerlodge, Gallatin and Custer National Forests

ENVIRONMENTAL DESCRIPTION: This type occurs on predominantly gentle slopes of fans and outwash areas in the foothills of mountain ranges of southcentral, southwestern and perhaps central Montana within the 10-14 inch precipitation zone on loams and silt loams formed primarily from alluvium and glacial till.

VEGETATION DESCRIPTION: *Pseudoroegneria spicata* conspicuously dominates these sites with *Koeleria macrantha* a weak sub-dominant and other graminoids (*Poa sandbergii*, *Pascopyrum smithii*, *Stipa comata* and *Bouteloua gracilis*) approach 100% constancy but generally constitute less than 5% of the overall composition. *Artemisia frigida* is consistently present in slightly more than trace amounts. The forb component is also, with the exception of *Astragalus striatus*, weakly represented.

NATURAL DISTURBANCES: Landscapes wherein this type are found are usually prime antelope and elk (winter) habitat, but their use does not appear to impair the type's ecological status. Based on research in the immediately adjacent dry *Pseudotsuga menziesii* forests (Arno and Gruell 1983), these areas burned in pre-settlement times with a minimum and maximum return interval of 5 and 74 years, respectively. The altered fire regime of today probably has allowed some encroachment of *Artemisia tridentata* but, has not resulted in decadent grass tussocks (grazing is a sufficient deterrent).

CONSERVATION RANK: G4?

RANK JUSTIFICATION: This association is broadly distributed and apparently has no special habitat requirements. It may represent just a slight compositional shift of some very common plant associations; the compositional differences with respect to well-recognized types appear so minor as to be caused by simple stochastic fluctuations or perhaps reflect grazing influences or minor geographic distinctions. Pending further review, this type's taxonomic status should be held in question.

MANAGEMENT COMMENTS: Within the *Pseudoroegneria spicata* Alliance *P. spicata* is the major forage species that declines under excessive grazing (Mueggler and Stewart 1080); a concommitant increase in *Stipa comata* cover and the size of *Bouteloua gracilis* mats is generally noted, along with an expansion in the numbers of *Artemisia frigida* and *Gutierrezia sarothrae*.

DATABASE CODE: CEGL001671

REFERENCES:

Arno, S. F. and G. E. Gruell. 1983. Fire history at the forest-grassland ecotone in southwestern Montana. Journal of Range Mangement 36(3): 332-336.

Martin, B., S. Cooper, B. Heidel, T. Hildebrand, G. Jones, D. Lenz and P. Lesica. 1998. Natural community inventory within landscapes in the Northern Great Plains Steppe Ecoregion of the United States. A report to the Natural Resource Conservation Service, Northern Plains Regional Office. The Nature Conservancy, Helena, MT. 211 pp.

Mueggler, W. F. and W. L. Stewart. 1980. Grassland and shrubland habitat types of western Montana. USDA Forest Service General Tech. Report INT-66. Intermountain Forest & Range Experiment Station, Ogden, Utah. 155 pp.

Ross, R.L., E.P. Murray, and J.G. Haigh. 1973. Soil and vegetation inventory of near-pristine sites, Montana. USDA Soil Conservation Service, Bozeman, Montana. 55 pp.

CLASS: HERBACEOUS VEGETATION

FORMATION: MEDIUM-TALL BUNCH TEMPERATE OR SUBPOLAR GRASSLAND (V.A.5.N.D)
ALLIANCE: PSEUDOROEGNERIA SPICATA HERBACEOUS ALLIANCE

PSEUDOROEGNERIA SPICATA - MUHLENBERGIA CUSPIDATA HERBACEOUS VEGETATION

COMMON NAME: Bluebunch Wheatgrass-Stony-Hills Muhly

COLLOQUIAL NAME: Bluebunch Wheatgrass - Plains Muhly Mixedgrass

COMMUNITY SUMMARY: This type has been described within a seventy five square mile study area of McCone County, Montana (Prodgers 1978) but has been noted elsewhere in the course of reconnaissance (Martin et al. 1998). It occurs in small patches on ridgetops and ridge shoulders having a cool aspect and is usually associated with stony and poorly developed soils, sites where moisture penetration is high. *Muhlenberia cuspidata* and *Pseudoroegneria spicata* are community co-dominants whose combined canopy cover averages more than 50%; other graminiods with high constancy but low coverages (<10%) include *Bouteloua gracilis, B. curtipendula, Schizachyrium scoparium* and *Carex filifolia*. The shrub component constitutes less than 5% combined cover; those having the highest constancy *are Artemisia frigida,*

Gutierrezia sarothrae and *Yucca glauca*. With the exception of *Phlox hoodii*, forbs are present in only trace amounts.

CLASSIFICATION COMMENTS: **ARCHIVED.** This association was originally known as *M. cuspidata – P. spicata* to reflect the higher coverages for the first-named species. The similarity of this type to *P. spicata – Bouteloua gracilis* (Mueggler and Stewart 1980), *P. spicata – Carex filifolia, P. spicata – B. curtipendula, Rhus trilobata / Agropyron spicatum* (Hansen and Hoffman 1988), and *P. spicata – Koeleria macrantha* (Ross et al. 1973), regarding both composition and site factors, raises some concern that this complex may be the result of overzealous splitting. The high cover value of *M. cuspidata* is about the only expressed difference between this type and many of the stands representing these similar associations.

SIMILAR COMMUNITIES: *Pseudoroegneria spicata – Bouteloua gracilis – Carex filifolia* community type (Prodgers 1978) *P. spicata – B. gracilis* (CEGL001664), *P. spicata – C. filifolia* (CEGL001665), *P. spicata – B. curtipendula* (CEGL001663), *Rhus trilobata / Carex filifolia* (CEGL001504) and *R. trilobata / Agropyron spicatum* (CEGL001120); portions of all the foregoing types exhibit varying degrees of dominance of *P. spicata* and/or *Muhlenbergia cuspidata* and occur in the same or related landscape positions (in addition to their respective diagnostic species). Of the communities co-occurring in the landscape with this type Prodgers describes *P. spicata – Bouteloua gracilis – Carex filifolia* as being most similar in vegetation composition and site parameters, differing by having more gravelly substrates.

OTHER NAMES: *Muhlebergia cuspidata – Agropyron spicatum* community type (Prodgers 1978)| *Pseudoroegneria spicata – Bouteloua gracilis – Carex filifolia* community type (Prodgers 1978)|

RELATION TO OTHER NAMES: =|?

COMMENTS ON OTHER NAMES:

ECOREGIONAL DISTRIBUTION: Northern Glaciated Plains Section (331E):CC| Northwestern Great Plains Section (331F):CC| Powder River Basin Section (331G):C?| Northwestern Glaciated Plains Section (331D):CC| (Note: the documented area of occurrence is only 75 square miles but is at the conjunction of four ecoregional Sections)

STATE DISTRIBUTION: This type has been described only from Montana.

NORTHERN GREAT PLAINS NATIONAL FOREST DISTRIBUTION:

ENVIRONMENTAL DESCRIPTION: This type occurs in small patches on ridgetops and ridge shoulders having a cool aspect and is usually associated with stony and poorly developed soils, sites where moisture penetration is hypothesized to be high. These soils may also be shallow, have experienced erosion (or non-development) of the A horizon, and highly exposed (litter layer poorly developed); no information has been presented regarding parent materials or soil texture.

VEGETATION DESCRIPTION: *Muhlenberia cuspidata* and *Pseudoroegneria spicata* are community co-dominants whose combined canopy cover averages more than 50%; other graminiods with high constancy but low coverages (<10%) include *Bouteloua gracilis, B. curtipendula, Schizachyrium scoparium* and *Carex filifolia*. The shrub component constitutes less than 5% combined cover; those having the highest constancy are *Artemisia frigida, Gutierrezia sarothrae* and *Yucca glauca*. With the exception of *Phlox hoodii*, forbs are present in only trace amounts; those with moderate to high constancy include *Gaura coccinea, Liatris punctata* and *Echinacea angustifolia*.

NATURAL DISTURBANCES: Because of the landscape position and general lack of fuel this type may experience only a mosaic burn or escape burns altogether.

CONSERVATION RANK: G3Q?

RANK JUSTIFICATION: The rank should remain with a ? because only two occurrences (Martin et al. 1998) have been noted beyond the initial sampling to substantiate its existence. Threats to this type have not been postulated but might include cattle grazing. However, a landscape position somewhat removed from water would tend afford some degree lessened impact. This type is documented from a very circumscribed area of northeastern MT, but the habitat description, though imprecise, would seem to indicate that the type could be much more widespread.

MANAGEMENT COMMENTS: *Pseudoroegneria spicata* and *Bouteloua gracilis* are the only herbs whose palatability ratings rank better than "fair" (Mueggler and Stewart 1980). Given the stressful nature of these environments and their high erosion potential grazing intensity should probably be light.

DATABASE CODE: CEGL001672

REFERENCES:

Hansen, P.L. and G.R. Hoffman. 1988. The vegetation of the Grand River/Cedar River, Sioux, and Ashland Districts of the Custer National Forest: a habitat type classification. USDA Forest Service General Technical Report RM-157, Rocky Mountain Forest and Range Experiment Station, Fort Collins, CO. 68 pp.

Martin, B., S. Cooper, B. Heidel, T. Hildebrand, G. Jones, D. Lenz and P. Lesica. 1998. Natural community inventory within landscapes in the Northern Great Plains Steppe Ecoregion of the United States. A report to the Natural Resource Conservation Service, Northern Plains Regional Office. The Nature Conservancy, Helena, MT. 211 pp.

Mueggler, W. F. and W. L. Stewart. 1980. Grassland and shrubland habitat types of western Montana. USDA Forest Service General Tech. Report INT-66. Intermountain Forest & Range Experiment Station, Ogden, Utah. 155 pp.

Prodgers, R. 1978. Circle West vegetation baseline study: Final Report. Circle West Technical Report No. 1. Energy Division, Montana Department of Natural Resources and Conservation. Helena. 115 pp.

Ross, R. L., E. P. Murray, and J. G. Haigh. 1973. Soil and vegetation inventory of near-pristine sites, Montana. USDA Soil Conservation Service, Bozeman, Montana. 55 pp.